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Pit and Quarry

With which is consolidated
CEMENT-MILL & QUARRY

May 18, 1932

Federal-Aid Is in Danger

Congress will adjourn next month and will probably not reconvene before December. The bills appropriating the usual $125,000,000 for federal-aid in 1933-1934 have not yet been reported out by the house or senate committees and until they are, of course, there can be no action on them by either branch of congress. Even after they are reported out it will be difficult to get them to a vote in the short time remaining. Never before has this important form of federal expenditure been in such a predicament.

There are hundreds of directions in which congress can economize in its efforts to balance the budget without causing as serious hurt as will inevitably follow the neglect of federal-aid. This has been one of the most important influences for highway construction in the past and we are still far from the time when the highway needs of the nation can afford even a temporary cessation of government help. The highways of the country have become of major importance in the economic life of America and while at times—and especially in the eyes of railroad executives—they act as serious competitors of the railways, they have in fact been of great service to the latter since they have contributed to them, through their use as well as through the production of the vehicles that travel our roads, many more millions of ton-miles of traffic than they have diverted from them. In spite of the truth of this statement, railroad executives continue to oppose highway building and their influence with members of congress may be expected to lie in the direction of repression in the case of federal-aid.

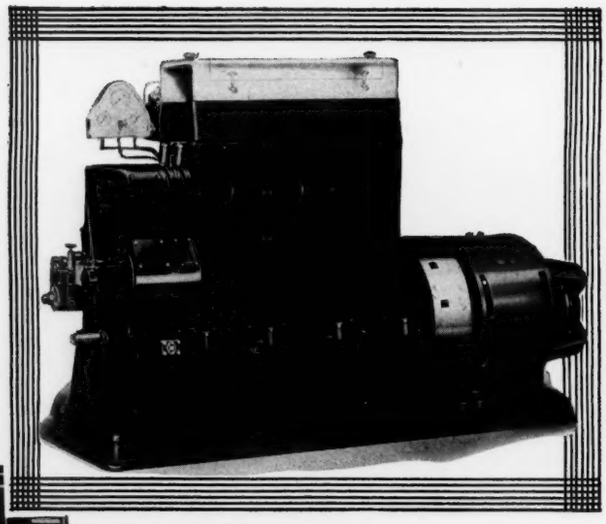
In this instance the associations of our industries are offered an uncommon opportunity for bold and concerted action. Their success, however, will depend not only on the silent approval of their membership but on the outspoken pleas of individual members. These must be clearly stated and must be directed to those who have the power to act.

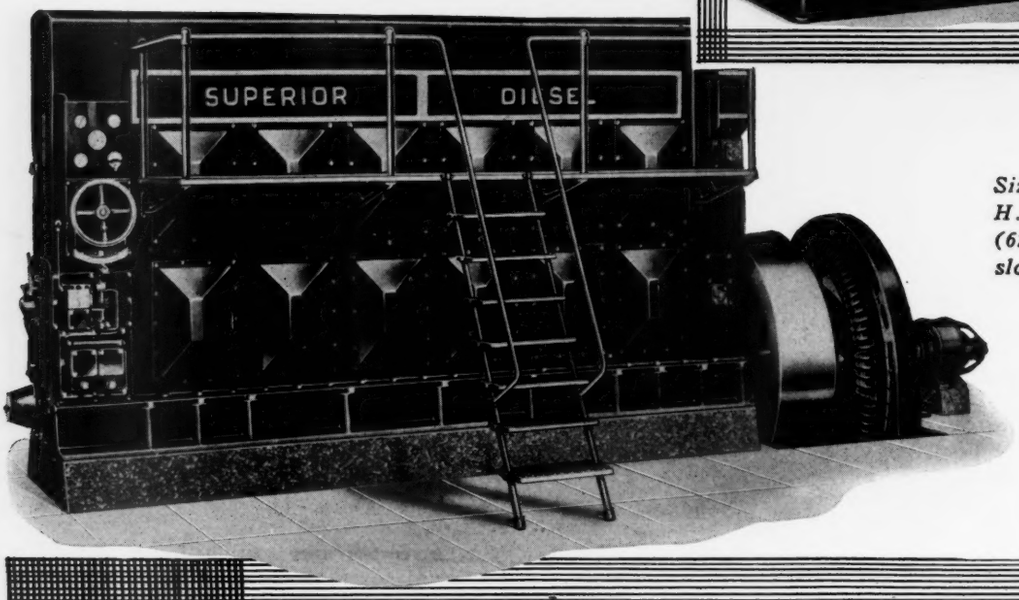
The federal-aid appropriation is in danger—grave danger—and its success will depend on the combined efforts of many men. Road-builders, state-highway departments, road-material producers, machinery manufacturers are some of those who have a vital interest in road work. In this problem your individual help is as important as that of any other single person. Prepare yourself for action when the time comes. Your help and support may be asked by your association's secretary any day, at any hour. Respond quickly and wholeheartedly; act decisively and courageously.

More than $100,000,000 of federal-aid expenditure may depend on what you do, and an equal amount of state expenditures depends on what congress does. So, if you are asked to help, don't delay. Save federal-aid for 1933 and, in so doing, for the years to follow.

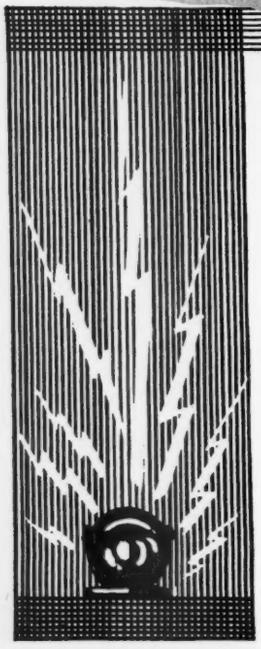
Since September 11, 1929, the largest net paid A. B. C. circulation in the field

TODAY'S ECONOMIES » » » TOMORROW'S DIVIDENDS » » » »





Sizes range from 50 to 750 H.P.—30 to 500 K.W. (625 K.V.A.) medium and slow speed.



Careful research in power costs is being made today to meet the present demand for economies that will form the foundation of future dividends.

Superior Diesel Generator Units are economical because of low operating and maintenance expense . . . reliable because of modern design and rugged construction of the Superior Diesel Engine . . . universal in application because they are available in models and sizes to meet the most exacting demands of Industrial, Municipal, or Public Utility service.

Write for bulletin No. 119-M for detailed information. It is free upon request.

SUPERIOR ENGINE COMPANY
SPRINGFIELD, OHIO

DIESEL · STATIONARY · ENGINES

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CURRENT

FATIGUE

You know the type of man who works under nervous tension. By 3 o'clock he is all in. Burned out. Fidgety and cranky. It is not natural for the human machine to work under internal stress.

So It Is With Wire Rope That Is Not Preformed

In non-preformed wire rope, wires and strands are under constant internal stress—because they are forcibly held in their helical positions. Witness how, when ordinary wire rope is cut, the strands and wires unravel and straighten out as the internal stress is relieved.

Due to internal inherent torsional strain, non-preformed wire rope wears out prematurely. Its life is cut short because the wires fatigue earlier and the rope loses its elasticity and strength.

TRU-LAY Preformed Wire Rope Resists Fatigue Resulting in Increased Service Which Averages Between 30% and 300% Over Non-Preformed Rope

The statement "30% to 300% increased service with TRU-LAY" is not merely an advertising claim. Hundreds of bona-fide service reports in our files prove that under the same operating conditions —and on the same equipment—TRU-LAY thus outwears and outlasts non-preformed wire rope.

If you are interested in lowering your wire rope costs, investigate TRU-LAY. For more facts, address:

ACCO

AMERICAN CABLE COMPANY, *Inc.*
New York Central Bldg., 230 Park Ave., New York, N. Y.
An Associate Company of the American Chain Company, *Inc.*
District Offices:
Atlanta, Chicago, Denver, Detroit, Philadelphia, Pittsburgh, Tulsa, San Francisco

NOTE THAT END REQUIRES NO SEIZING

This illustration is made from an honest, unretouched photograph of Tru-Lay Preformed Wire Rope. Only in Preformed Wire Rope will the strands and wires stay in position without seizing or tying the end as this photograph reveals.

In Tru-Lay, wires and strands are helically shaped so they lie in position, *relaxed*. There is no straightening-out tendency—no internal stress. The result is less fatiguing action, longer life, easier handling, greater flexibility, just to mention a few of the advantages of TRU-LAY.

Tru-lay is furnished in every grade, type and construction developed over a long period of years . . . and every TRU-LAY PREFORMED ROPE gives 30% to 300% longer service over non-preformed wire rope of similar grade, type and construction.

TRU-LAY *Preformed* WIRE ROPE

30% to 300% *Increased Service* { *Depending upon the character of the service and type of equipment*

Pit and Quarry

With which is consolidated
CEMENT-MILL & QUARRY

Volume 24 May 18, 1932 Number 4

MEMBER AUDIT BUREAU OF CIRCULATIONS

Published bi-weekly on Wednesday for producers and manufacturers of Cement, Crushed Stone, Gypsum, Lime, Sand, Gravel and other non-metallic minerals. Entered as second-class matter October 9, 1928, at the Postoffice at Chicago, Ill., under the Act of March 3, 1879.

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9 YEARS IN CONSTANT USE

NEVER A SHUT-DOWN ON ACCOUNT OF MOTIVE POWER

"WORKING NICELY."—"No complaint."—"Never had a shut-down on account of motive power in all the time we have used Whitcomb Locomotives."

Comments of this encouraging nature come from the New York Trap Rock Company, one of the largest producers of crushed stone in New York territory.

In February, 1923, this company purchased four 9-ton Whitcomb locomotives. The next year two more were purchased, and they have been using these six locomotives constantly ever since.

Competent dependable hauling at surprising savings are made possible for any project through the use of Whitcomb Locomotives. Whatever your requirements, there is a size and type of Whitcomb to make the grade and haul the load.

"Uninterrupted efficiency" is the Whitcomb watchword. *Send for particulars.*

The Whitcomb Locomotive Company, *Rochelle, Illinois*

WHITCOMB LOCOMOTIVES

Classified Buyers' Guide

A Directory of PIT AND QUARRY Advertisers Arranged According to Product

Although every effort is made to insure accuracy and completeness in these listings, the publisher cannot accept responsibility for errors or omissions. Any mistakes discovered will gladly be rectified, if brought to the attention of the Advertisers' Service Department.

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Traylor Eng. & Mfg. Co.

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Air Separators
Bradley Pulverizer Co.
Gay Co., Inc., Rubert M.
Gruendler Crusher and Pulverizer Co.
Hardinge Co.
Raymond Bros. Impact Pulv. Co.
Universal Road Machinery Co.

Automatic Feeders
Hardinge Co.
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Automatic Weighers
Schaffer Poidometer Co.

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Hardinge Co.

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Hardinge Co.

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Chain Belt Co.

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Hardinge Co.
Raymond Bros. Impact Pulv. Co.

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Iowa Mfg. Co.

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Gruendler Crusher and Pulverizer Co.
Iowa Mfg. Co.
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Smith Engineering Works
Traylor Eng. & Mfg. Co.
Universal Road Machy. Co.

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McLanahan and Stone Corp.

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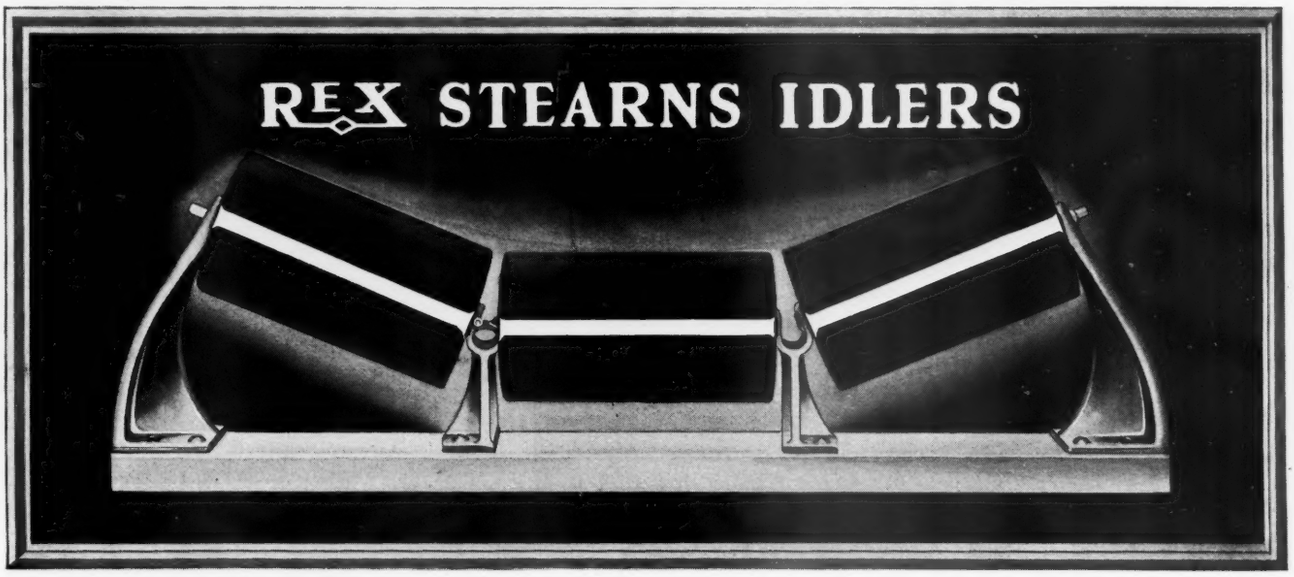
Dredge Chain (See Chain)

Dredge Pipe (See Pipe)

Drilling Accessories
Loomis Machine Co.

CHAIN BELT COMPANY



Idlers—Idlers—Idlers

IDLERS—Designing and building them is the major part of our business.

To do our job well has necessitated a wide study of the operation of Timken Idler Equipment under all conditions.

The Rex-Stearns Timken Complete Line is, today, the result of ten years' experience, confined exclusively to the development and application of Anti-Friction Idler Equipment. It now incoporates Tubular Steel, Grey Iron, Chilled Face Cast Iron and Rubber Covered Units. The combination of these types with the various styles of supporting frames makes possible the selection of the RIGHT Idler for the RIGHT place.

Now, we pass them into your business.

IDLERS—Operating and maintaining them is a part of your business.

To do your job well requires Idler Equipment best suited to your own special conditions.

This outstanding range—both Price and Service—makes your job of selecting equipment an easier one today. It is no longer necessary to adapt your requirements to a line—the Rex-Stearns Timken Line is adapted to your requirements.

Returning the coupon below will bring you further information as to the type or kind of Rex-Stearns Timken Idler that will insure for you Low Initial Cost, Long Equipment Life, Longer Belt Life and finally, Lowest Cost Per Ton for conveying material by belt.

THE STEARNS CONVEYOR COMPANY

THE STEARNS CONVEYOR CO., 994 East 200th Street and St. Clair Avenue, Cleveland, Ohio. Division of:
CHAIN BELT COMPANY, 1646 West Bruce St., Milwaukee, Wisconsin. We are interested in the merchandise checked below:

Name.....Title.....Firm Name.....

Address.....City.....State.....

☐ Rex-Stearns Timken Style No. 37 Troughing Idler.

☐ Rex-Stearns Timken Style No. 38 Picking Belt Idler.

☐ Rex-Stearns Timken Style No. 37 Rubber Covered Idler.

☐ Rex-Stearns Timken Style No. 30 Machinery Application Idler.

☐ Rex-Stearns Style No. 36 Combination Grain Elevator Idler.

☐ Rex-Stearns Timken Style No. 57 Heavy Duty 5-Pulley Troughing Idler.

☐ Rex-Stearns Timken Style No. 31 Troughing Idler with Self-Cleaning base.

☐ Rex-Stearns Timken Style No. 39 Tubular Steel Troughing Idler.

☐ Rex-Stearns Timken Style No. 52 5-Pulley Troughing Idler with Self-Cleaning base.

☐ Rex-Stearns Timken Style No. 33 Self-Aligning Idler.

☐ Rex-Stearns Roller Bearing Style No. S-6 Flat Carrying Idler.

☐ Rex-Stearns Roller Bearing Style No. S-1 Return Idler.

(Note): Idlers of types shown above can be furnished with pulley units of Tubular Steel, Grey Iron or Chilled Face Cast Iron construction, depending upon service requirements.

CHAIN & BELT CONVEYING

Established 1891—Branch Offices in 17 Cities

Classified Buyers' Guide

A Directory of PIT AND QUARRY Advertisers Arranged According to Product

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Drilling Contractors
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Loomis Machine Co.

Drills, Diamond
Pennsylvania Drilling Co.

Drills (Rock)
Loomis Machine Co.

Drills (Well) (See Drills—Blast-Hole)

Drives (Multiple Belt, Chain, Rope)
Chain Belt Co.

Dryers
Hardinge Co.
Iowa Mfg. Co.
Lewistown Fdry. & Mach. Co.
McLanahan and Stone Corp.
Traylor Eng. & Mfg. Co.

Dust-Collecting Systems
Raymond Bros. Impact Pulverizer Co.

Dynamite (See Explosives)

Elevators (See Conveyors and Elevators)

Elevator Belting (See Belting)

Engineers
Allen Cone and Machy. Corp.
Cross Engineering Co.
Iowa Mfg. Co.
McLanahan and Stone Corp.

Engines (Diesel)
Superior Engine Co.

Engines (Internal-Combustion)
Superior Engine Co.

Excavating Machinery (See Shovels; Cranes; Buckets; etc.)

Feeders
Chain Belt Co.
Hardinge Co.
Iowa Mfg. Co.
Morrow Mfg. Co.
Smith Engineering Works

Fuses (Detonating)
Ensign-Bickford Co.

Gasoline Engines (See Engines—Internal-Combustion)

Gates (Bin) (See Bin Gates)

Gears (Herringbone)
Chain Belt Co.

Gears and Pinions
Chain Belt Co.

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Generators (See Motors and Generators)

Glass Sand Equipment
Lewistown Foundry & Machine Co.

Grab Buckets (See Buckets—Clamshell, Orange-Peel, etc.)

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Traylor Eng. & Mfg. Co.
Universal Road Machy. Co.

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Georgia Iron Works

Hammer Mills (See Crushers—Hammer)

Hoists
Iowa Mfg. Co.
McLanahan and Stone Corp.
Smith Engineering Works

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Hydraulic Guns (See Guns—Hydraulic)

Idlers
Chain Belt Co.
Smith Engineering Works

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Hardinge Co.
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Hardinge Co.

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Hardinge Co.
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Hardinge Co.

Lime and Hydrating Plants
Hardinge Co.

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Locomotives (Diesel)
Whitcomb Locomotive Co.

Locomotives (Diesel-Electric)
Whitcomb Locomotive Co.

Locomotives (Electric, Gas and Steam)
Whitcomb Locomotive Co.

Locomotives (Gas-Electric)
Whitcomb Locomotive Co.

Locomotives (Oil-Electric)
Whitcomb Locomotive Co.

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Mill Liners and Linings
Hardinge Co.

Mills (Grinding) (See also Crushers—Hammer)
Allen Cone and Machy. Corp.
Bradley Pulverizer Co.
Hardinge Co.
Lewistown Fdy. & Mach. Co.
Raymond Bros. Impact Pulv. Co.
Traylor Eng. & Mfg. Co.

Motors (Internal-Combustion) (See Engines—Internal-Combustion)

Nails
American Steel & Wire Co.

Nozzles (Hydraulic) (See Guns—Hydraulic)

Ore Separators
Allen Cone and Machy. Corp.

Oxygen (Liquid) (See Liquid Oxygen)

Perforated Metal Plates
Chicago Perforating Co.
Cross Engineering Co.
Morrow Mfg. Co.

Pipe Flanges
Georgia Iron Works

Plug Valves (See Valves)

Pneumatic Drills (See Drills, Rock)

Poidometers
Schaffer Poidometer Co.

Portable Conveyors
Iowa Mfg. Co.

Portable Engines (See Engines—Internal Combustion)

Portable Loaders (See Loaders and Unloaders)

Power Cable (Rubber Clad)
American Steel & Wire Co.

Power Shovels (See Shovels, Electric, Internal-Combustion and Steam)

MONITOR SILVER STRAND
AMERICAN STEEL & WIRE COMPANY
The TIGER TRADE MARK is a symbol of Strength and Dependability
THE MARK FOR GENUINE AMERICAN WIRE ROPE

AMERICAN
STEEL & WIRE COMPANY
WIRE ROPE

The Choice of Leaders

Monitor Silver Strand Wire Rope is an outstanding achievement of the American Steel & Wire Company. Into its manufacture go not only the highest quality materials—but the rich experience gained through 100 years of wire development.

A standard for gruelling service—the strongest grade of steel used in wire rope construction assures strength to spare.

Monitor Silver Strand Wire Rope offers you many economical and service advantages. Write us for complete details—and request our engineers to cooperate in solving your particular problems.

1831 MORE THAN 100 YEARS of PROGRESS IN WIRE MAKING **1932**

AMERICAN STEEL & WIRE COMPANY

208 South LaSalle Street, Chicago — SUBSIDIARY OF UNITED STATES STEEL CORPORATION — And All Principal Cities

Pacific Coast Distributors. Columbia Steel Company, Russ Building, San Francisco — *Export Distributors:* United States Steel Products Company, New York

Classified Buyers' Guide

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Pulverized Fuel Systems
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Gruendler Crusher and Pulverizer Co.
Hardinge Co.
Lewistown Foundry & Machinery Co.
Raymond Bros. Impact Pulverizer Co.

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Pumps (Centrifugal)
Allen Cone and Machy. Corp.
Chain Belt Co.
Georgia Iron Works

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Georgia Iron Works

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Allen Cone and Machy. Corp.
Georgia Iron Works

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Scrapers (Power Drag)
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Allen Cone and Machy. Corp.
Chain Belt Co.
Chicago Perforating Co.
Cross Engineering Co.
Deister Machine Co.
Gay Co., Inc., Rubert M.
Gruendler Crusher and Pulverizer Co.
Hardinge Co.
Iowa Mfg. Co.
Lewistown Foundry & Machinery Co.
McLanahan and Stone Corp.
Morrow Mfg. Co.
Smith Engineering Works
Traylor Eng. & Mfg. Co.
Universal Road Machinery Co.

Screens (Vibrating or Shaking)
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Deister Machine Co.
Gay Co., Inc., Rubert M.
Gruendler Crusher and Pulverizer Co.
Iowa Mfg. Co.
Lewistown Foundry & Machinery Co.
McLanahan and Stone Corp.

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Gruendler Crusher and Pulverizer Co.
McLanahan and Stone Corp.

Silos
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Skip Hoists and Skips
Chain Belt Co.

Speed Reduction Units
Chain Belt Co.
Iowa Mfg. Co.

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Sprockets and Chain
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Iowa Mfg. Co.

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Steel (Bars, Shapes, Plates, etc.)
Ryerson and Son, Inc., Joseph T.

Steel Inclines (See Inclines, Steel)

Steel Grating (See Grating, Steel)

Storage Equipment
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Tanks (Sand-Settling)
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Iowa Mfg. Co.
Morrow Mfg. Co.
Smith Engineering Works

Thickeners (Slurry)
Hardinge Co.

Tools (Drill) (See Drilling Accessories)

Tramways (Aerial)
American Steel & Wire Co.

Transmission Belting (See Belting)

Transmission Machinery
Chain Belt Co.
Gruendler Crusher and Pulverizer Co.

Trippers
Chain Belt Co.

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Truck Mixers
Chain Belt Co.

Tube Mills (See Mills—Ball, Tube, etc.)

Tube-Mill Liners (See Mill Liners and Linings)

Unloaders (Box Car)
Chain Belt Co.

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Manheim Mfg. & Belting Co.

Variable Speed Reducers or Transmissions
Chain Belt Co.

Vibrating Screen Plate
Chicago Perforating Co.
Cross Engineering Co.
Morrow Mfg. Co.

Vibrating Screens (See Screens—Vibrating)

Washers (Sand, Gravel, and Stone)
Allen Cone and Machy Corp.
Hardinge Co.
Iowa Mfg. Co.
Lewistown Foundry & Machinery Co.
McLanahan and Stone Corp.
Smith Engineering Works
Traylor Eng. & Mfg. Co.
Universal Road Machinery Co.

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Schaffer Poidometer Co.

Welding Supplies
American Steel & Wire Co.

Well Drills (See Drills—Well)

Wheels (Car)
Iowa Mfg. Co.

Winches and Capstans
Chain Belt Co.

Wire-Rope Fittings
American Cable Co., Inc.
American Steel & Wire Co.

Wire and Cable (Electric)
American Steel & Wire Co.

Wire Rope
American Cable Co., Inc.
American Steel & Wire Co.

Wire Rope Slings
American Cable Co., Inc.
American Steel & Wire Co.

Wire (Welding)
American Steel & Wire Co.

Worm Gears (See Gears and Pinions)

Fourteenth Annual Convention

National Lime Association

Cleveland, Ohio

TUESDAY—WEDNESDAY

MAY 24 and 25, 1932

All sessions in the Empire Room of the Cleveland Hotel.

[Regardless of whether or not they are members of the National Lime Association, all lime manufacturers are invited and urged to attend this convention]

A FEW HIGHLIGHTS

"Whither Are We Bound" is the subject of an important address by a speaker of nation-wide reputation in the construction field.

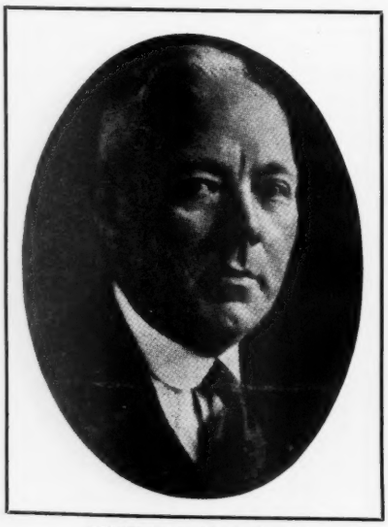
"Oiling Sales Machinery"—by one who thoroughly understands the true art of salesmanship and practices it successfully in his business.

"Is the Lime Industry Suffering from Overproduction?" All phases of this subject will be thoroughly presented by four manufacturers of lime. The opening talk will be made by a real merchandiser of lime products and there will be ample opportunity for discussion from the floor.

"Potential Lime Tonnage in the Field of Sanitation." Faced with the necessity of reducing operating expenses, municipalities throughout the country are investigating and developing more economic systems of sewage disposal involving the use of lime. As considerable new tonnage may develop in this field, the subject should be of interest to all producers of chemical lime.

The "Future of Soil Liming" will be discussed by one of the earliest advocates of the use of lime on the soil—a pioneer and one who knows the subject of soil improvement.

The annual dinner of the industry will be held the evening of May 24. Two especially capable speakers will make this part of the program well worth the attendance of everyone. In addition, there will be a versatile program of singing and dancing by Cleveland's best professional talent in the entertainment field.



GENERAL L. H. CALLAN

GENERAL CALLAN ISSUES ORDER TO REDUCE COSTS

When General Callan, of the Callan Construction Company, Bristol, R. I., decided to increase his production without increasing his costs, naturally he looked for more efficient crushing equipment.

He bought a Cedar Rapids Heavy Duty 14x36 Primary Crusher.

After the Cedar Rapids Crusher had been installed, it was found that it would do the same work that had previously required two crushers of competitive make. The Cedar Rapids Crusher **"actually did the work of two crushers."**

This is only one of many similar installations where it has paid the plant owner to buy "Cedar Rapids" Equipment. If you are interested in reducing YOUR COSTS and at the same time INCREASING YOUR CAPACITY, it will pay you to get in touch with us immediately.

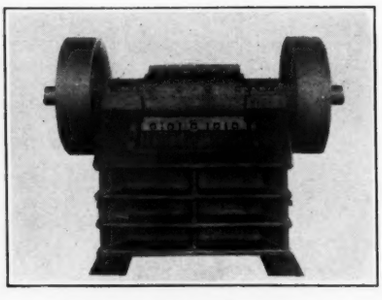
The Cedar Rapids Line Includes

PRIMARY CRUSHERS	BUCKET ELEVATORS
SECONDARY CRUSHERS	FIELD CONVEYORS
REVOLVING SCREENS	WASHING PLANTS
VIBRATOR SCREENS	STONE SIZING PLANTS
ALL STEEL BINS	DRAG SCRAPER HOISTS
DRAG SCRAPER BUCKETS	STEEL SHEAVES

ALSO

CEDAR RAPIDS BITUMINOUS ROAD MIXERS
CEDAR RAPIDS PORTABLE PREMIX PLANTS

Write Today for Complete Catalog
"BUY CEDAR RAPIDS PERFORMANCE"



Cedar Rapids 14x36 Heavy Duty Primary Crusher

» » MATERIAL HANDLING EQUIPMENT « «

Made by
Iowa Manufacturing Company
Cedar Rapids, Iowa

"Performance Is What Counts"

VOLUME 24 NUMBER 4

Pit and Quarry

With which is consolidated

CEMENT-MILL & QUARRY

CHICAGO, MAY 18, 1932

Here's Latest Rumor of New Cement Plant

WOULD SUPPLY BOULDER DAM

Despite the admitted over-built condition of the cement industry and its ability to care for the demand even in times of prosperity and heavy construction, new plant projects are constantly springing up. The latest rumor comes from Arizona and the *Kingman Miner* has this to say:

"A $2,000,000 cement plant, designed to fill the needs of the Boulder Canyon project (Hoover Dam) for the largest single order of cement ever placed, will in all probability be erected somewhere between Las Vegas and Boulder City during the next 18 months, it was learned from an authoritative source this week.

"Representatives of one of the largest cement concerns in the southwest have recently completed an investigation of the possibilities of such a plant, to furnish the material for the dam structure itself, and are understood to have reached the conclusion that cement can be produced in Nevada at a price some 28 cents a barrel less than it can be shipped in from the outside.

"First concrete on the dam proper will not be poured for some 18 months yet, reclamation bureau officials declared.

"The cement plant as proposed, however, would take perhaps a year to complete, and would employ in the neighborhood of 750 workmen."

All which probably sounds good to one outside the industry and probably could be whipped into an apparently logical argument for the sale of stock in such a project. But the picture of a $2,000,000 plant standing out in the desert after the dam had been completed would probably not be included in the prospectus.

One Dead, Another Hurt in 150-Foot Stack Fall

Dennis Rose, 21, of Buffalo, Ia., employed by the Alphonse Custodis Chimney Contracting Co., of Chicago, was instantly killed, and C. Zeh, of Chicago, suffered fractures of both legs when they fell 150 ft. from a smokestack at the Dewey Portland Cement Company plant near Davenport, Ia., recently. The men were being lowered from the top of a 207 ft. chimney in a steel bucket when the operator of the hoist lost control.

Fire Destroys Packing House; Loss Is $60,000

Fire of undetermined origin destroyed the packing plant and damaged a part of the storage house of the Consolidated Cement Co. at Cement City, Mich., entailing a loss estimated at between $60,000 and $70,000, on the morning of May 2.

Firemen succeeded in getting the fire under control shortly before noon.

Aside from the destruction of the packing plant much of the loss involved machinery and stock on hand.

Blast in Pennsylvania Dislodges 60,000 Tons

More than 60,000 tons of stone were brought down in a shot at the White Haven, Pa., quarry of the General Crushed Stone Co. on April 27, enough to supply the operations for the present season. In detonating the blast, 18,800 lb. of 60-per cent. gelatine dynamite was used.

Tennessee River Plant Busy on Road Contract

The Smiley Sand & Gravel Co. of Erin, Tenn., has obtained a substantial contract for supplying sand and gravel for state road work in that vicinity and is shipping 15 to 20 carloads of material daily from its operations on the Tennessee River near Danville.

New $150,000 Slag Plant Is Planned at St. Louis

A new concern, the General Aggregate Corp., has been formed at St. Louis, Mo., and has announced plans for the erection of a $150,000 plant to produce aggregates from blast-furnace slag.

Claude H. Hunsaker, St. Louis manager of the Massey Concrete Products Co.; Bert Boaz, secretary-treasurer of the Boaz-Kiel Construction Co.; and H. E. Billman, president of the Industrial Construction Co. were the incorporators.

Lime Producers Will Gather at Cleveland

CONVENTION TO OPEN MAY 24

The program for the annual convention of the National Lime Assn. to be held May 24 and 25 at the Hotel Cleveland, Cleveland, O., is rapidly taking shape. A number of interesting speakers of national reputation have accepted the invitation to address the convention.

Definitely scheduled are addresses by Willard T. Chevalier, publishing director, *Engineering News-Record;* Charles Warner, president, The Warner Co.; Dr. David Friday, economist, Washington, D. C.; and Rev. Dr. Joel B. Hayden, Western Reserve Academy, Hudson, O.

A symposium on merchandising will be heard on Tuesday, May 24. Contributing will be Donal O'Connor (Rockland & Rockport Lime Corp.); Thomas L. Read (Kelley Island Lime & Transport Co.); George I. Purnell (American Lime & Stone Co.), and J. M. Deely (Lee Lime Corp.).

Other features of the two-day session will include discussions by men in the lime industry whom most operators know personally. The theme of these talks will be that of constructive marketing in developing the tremendous potential tonnage for lime in the construction field, which is much greater than most manufacturers realize.

While the program in general will be devoted strictly to business in an attempt to unravel some of the many serious problems confronting our industry, a period of relaxation from the mental worries and cares of the times has been arranged for the evening of May 24. The annual banquet has been scheduled for 7:00 p. m., during which music will be provided by a trio of versatile artists.

Immediately following the banquet there have been scheduled two short addresses by men prominent in their respective lines of endeavor—one, a discussion involving present-day nation-wide economic problems and the other, perhaps not so serious in text, but a talk very much worth-while because of the lasting thoughts which will be left with the audience.

Three Firms Accede to Wisconsin Demand

MANITOWOC ORDER INCREASED

The Wisconsin cement-price controversy, which arose when the state highway department issued an ultimatum to bidding companies that they lower their price in accordance with the profitless basis on which Illinois awarded its contracts, appears to have been settled.

Under the arrangement, Wisconsin will save $200,000, the Manitowoc Portland Cement Co. has its order increased from 425,000 to 600,000 bbl. and only three companies will supply the state's cement requirements.

The Manitowoc company agreed to reduce its price 13 c. per bbl., a deduction of the freight differential it enjoys over other companies outside the state. The Alpha Portland Cement Co. will supply 62,500 bbl. and the Marquette Cement Mfg. Co. the balance of about 487,500 bbl.

Ten companies originally won awards at higher prices. Seven of these refused to cut prices and are presumably left "out in the cold."

Holmes Safety Award to J. E. Baker Co. Quarries

Quarries of the J. E. Baker Co. won the Joseph E. Holmes safety award for 1931 and the certificate of honor was presented to officials of the company by Daniel Harrington, secretary of the Holmes Safety Assn. and an official of the U. S. Bureau of Mines, at the company's fourth annual safety dinner held recently at the Hotel Yorktowne at York, Pa.

The company made a most impressive showing last year, reducing its accident record by 95 per cent. from the preceding year. Its quarries have had no lost-time accidents since December 4, 1931, and no fatal accidents for five years.

New Mill to Supply All Cement in Central Asia

A large cement plant was scheduled to start operations this month at Kuvassy, in Soviet Central Asia, which is expected to produce 4,500,000 bbl. this year. All equipment in the basic departments has been assembled and is ready for operations. It is expected that the plant will supply the cement necessary for all construction projects now under way in Central Asia.

O'Neill Again Chosen to Head International Co.

At the annual meeting of the International Portland Cement Co., held at Spokane, Wash., R. K. Neill was reëlected president. William F. Powell, vice-president; H. M. Heleniak, sales manager and treasurer; and G. M. Bell, treasurer, were again chosen to serve during the year.

The company's plant at Irvin, Wash., is preparing to resume production and visiting stockholders who attended the meeting were shown over the property.

Government Dredge and Scows Sold to Producer

The Portsmouth Sand & Gravel Co. of Portsmouth, O., has purchased the government dredge *Malta* and two dump scows. The company bid $1,400 for the floating equipment after it had been offered for sale to the highest bidder by the U. S. Engineering Department. The purchaser has towed the vessels to its home port from Lowell, O., where they were tied up in the Muskingum River.

On Half-Time Basis at Slag Plant in Ironton

Operations have been resumed at the Ironton, O., plant of the Standard Slag Co. after a period of several weeks during which the plant was idle.

Production is proceeding at one-half capacity and prospects are for a run throughout the summer at least on that basis.

Wolf Valley Stone Co. Formed at New London

The Wolf Valley Stone Co. has been formed at New London, Wis., and is preparing to begin producing crushed stone and pulverized material for agricultural markets. The old Hodgins quarry near New London has been acquired and processing equipment is now being installed. Three motor trucks have been purchased to handle local deliveries.

Iowa Limestone Company Has Resumed Operations

Shut down for more than eight months the Iowa Limestone Co., crushed stone and allied products of Alden, Ia., has resumed operations with orders in advance and others in prospect that will keep the plant in operation during the summer months at least.

Company in Iowa Urges Use of Sand on Lawns

The Molo Sand & Gravel Co., of Dubuque, Ia., has placed a 4-page brochure in the hands of practically every home owner in the county giving the secret of a beautiful lawn through use of sand. The folder gives soil conditions of the county of Dubuque, tells how clay soil may be improved by sand and how sand is used to make a beautiful lawn.

New Texas Plant to Do Custom Grinding

PLANS BUILDING AT HOUSTON

The Earth Products Co., recently incorporated at Houston, Tex., has purchased a block of land in the industrial section of Houston convenient to the ship channel and railroad facilities. Plans and specifications have been completed for the erection of a building 75 ft. by 300 ft. A feature of the building will be the all-steel raw-material storage bins, with a capacity of 75 carloads. Modern equipment will be installed including an automatic conveying system to facilitate the rapid handling of the many products to be processed.

The proposed plant will be divided into three sections. One division will be devoted exclusively to the preparation of bleaching earths, with a capacity of 300 tons of finished materials per day. Another division will be devoted to the preparation of stucco, plaster, high-temperature refractories, asbestos, molding sand, silica flour, volcanic ash, talc, calcium carbonate, barite, kaolin, and natural color sands and aggregates.

A third division will be known as the custom grinding division—and in addition to the processing of materials from its own properties, the company will be equipped to do general custom grinding of any non-metallic commodities to the customer's specifications.

The officers and directors of the Company are: W. W. Rodgers, president; E. G. Noxon, executive vice-president and general manager; Walter Morgan, vice-president; and Grace V. Noxon, secretary and treasurer.

Kosmos Portland Soon to Make Super Cement

The Kosmos Portland Cement Co. has been licensed by the Super Cement Co. of Detroit to produce Kosmos "Super Cement" for sale in its territory. There are now 14 plants producing "Super Cement" under license. As a result of its waterproof and high-early-strength qualities, Kosmos "Super Cement" makes a better concrete, and furnishes a single standard of excellence. Its outstanding features are described in *Kosmos Cement News* for April, 1932, a copy of which may be obtained by writing Kosmos Portland Cement Co., Louisville, Ky.

Birmingham Slag Co. in New Two-Story Building

The Birmingham Slag Co. is now located in its new two-story building at 2019 Sixth Ave. N, in Birmingham. The company occupies the entire second floor, the ground floor having been leased to the Lehigh Portland Cement Co.

N.S. & G.A. Directors Meet at Indiana Spa

ROAD-WORK OUTLOOK SCANNED

The menace of the increasing tendency toward the diversion of gasoline-tax funds to other uses than those for which they were intended occupied a large share of the attention of the directors of the National Sand & Gravel Assn. at their mid-year meeting at West Baden Springs, Ind., May 10 and 11. It seemed to throw a dark cloud of uncertainty around the business expectations of producers in various parts of the country, adding a further element of uncertainty to the already growing doubt about congressional action on the 1933-1934 federal-aid program.

In spite of these disturbing factors, however, increasing confidence in the return of better business was evident. In reporting on business conditions in their respective fields of operation, the directors agreed about as closely in confidently expecting a rise in the demand for their products as they did in describing present conditions. With a few exceptions they reported present business as disappointing, due largely to the fact that the letting of road contracts has been deferred in many cases, but, as this same reason would seem to promise an improvement as soon as these contracts are awarded, they look for an increased demand as the season progresses.

In many places prices exhibit a stiffening tendency that can be attributed in some instances to a growing realization among competing producers of the futility and destructive effects of price-cutting. While prices are admittedly still too low for uniformly profitable operation, improvement is already noticed. State and other highway agencies are showing the same tendency as that displayed by commercial buyers to insist on buying at the lowest prices previously reported and, wherever possible, to force them still lower. The necessity for remedying this situation is only too evident and producers, realizing their community of interests, are acting to correct it.

Discussion of the uncertainty surrounding federal-aid appropriations for the next fiscal year brought out the need for immediate action on the part of all those interested in road-building if keen disappointment is to be averted. As pointed out by Mr. Ahearn, congress has not yet made any appropriation for federal-aid work and it may not do so in the few weeks that remain before its adjournment. The president's opposition to the bill for emergency highway building has added to congress' natural timidity about appropriation bills at this time, so that unusual efforts will be needed to get the federal-aid bills reported out and favorably acted upon.

The 1933 convention of the association was discussed and its place and date fixed. Owing to the nature of the general plan, no official announcement will be authorized until later.

The following persons were present:

Officers and Directors

V. P. Ahearn (executive secretary, National Sand & Gravel Assn., Washington, D. C.).
H. N. Battjes (Grand Rapids Gravel Co., Grand Rapids, Mich.).
Paul P. Bird (Boston Sand & Gravel Co., Boston, Mass.).
J. C. Buckbee (Northern Gravel Co., Chicago, Ill.).
Otto S. Conrades (St. Louis Material & Supply Co., St. Louis, Mo.).
V. A. Cordes (Wolf River Sand & Gravel Co., Memphis, Tenn.).
Alexander F. Foster, Jr. (Warner Co., Philadelphia, Pa.).
M. B. Garber (Thew Shovel Co., Lorain, O.).
V. O. Johnston (Lincoln Sand & Gravel Co., Lincoln, Ill.).
W. H. Klein (Dixie Sand & Gravel Co., Chattanooga, Tenn.).
M. A. Neville (Western Indiana Gravel Co., Lafayette, Ind.).
Frank W. Peck (Peck-Thompson Sand & Material Co., Kansas City, Mo.).
John Prince (Stewart Sand & Material Co., Kansas City, Mo.).
F. W. Renwick (Chicago Gravel Co., Chicago, Ill.).
J. M. Settle (Ohio River Sand Co., Louisville, Ky.).
Stanton Walker (director, Engineering & Research Division, National Sand & Gravel Assn., Washington, D. C.).

Associate Members

S. A. Phillips (PIT AND QUARRY, Chicago, Ill.).
N. C. Rockwood (*Rock Products*, Chicago, Ill.).

Guests

D. Pearson (Stephens-Adamson Mfg. Co., North Aurora, Ill.).
George Renwick (Chicago Gravel Co., Chicago, Ill.).

District Attorney Steps Into Cement-Dust Battle

The Smith-Emery Co. of San Francisco, Cal., has been appointed by District Attorney James F. Hoey of Contra Costa County in California to make a chemical analysis of the dust emanating from the plant of the Cowell Portland Cement Co. A study of the density of the dust is also to be undertaken.

Ranchers in the vicinity of the plant have been up in arms for years against the cement company, claiming the dust which settles over the valley is ruinous to their crops and grazing lands.

Indiana Stone Producer Opens Louisville office

The Salem Lime & Stone Co., Inc., with plants and quarries located at Salem, Ind., has opened a general sales office in the Louisville Trust Bldg., Louisville, Ky.

Pre-Mixed Concrete Specification Chosen

ASSOCIATION DIRECTORS MEET

A proposed tentative specification for ready-mixed concrete, issued May 5, 1932, by the American Society for Testing Materials, was considered and favorably acted upon by the directors of the National Ready-Mixed Concrete Assn., who met May 12 at West Baden Springs, Ind. Although not in its final form, the specification as tentatively drafted is considered a significant step forward in the direction of maintaining the high standards already in use by the most successful ready-mixed concrete producers. It is confidently believed that the adoption of these specifications will have further good effects in making it increasingly difficult for ill-equipped or fly-by-night producers to market an inferior product when high quality is required.

The specification as now framed sets up rigid requirements for materials, proportions and consistency, measurement, mixing, delivery, inspection, test methods, acceptance and rejection. The aim has been to improve the quality of the product and to insure means for guaranteeing and demonstrating the extent to which the product shall meet the requirements of the service in which it is to be used. The importance of the subject won for its consideration the major portion of the forenoon and afternoon sessions, and when the meeting adjourned everyone felt that the topic had been exhaustively debated and had been given the careful consideration it deserved.

There was much discussion of the date and place of the next annual convention, but, although a decision was reached, no formal announcement will be made until later.

The following were in attendance:

Officers

V. P. Ahearn (executive secretary, National Ready-Mixed Concrete Assn., Washington, D. C.).
A. C. Avril (Avril Tru-Batch Concrete, Inc., Cincinnati, O.).
Paul P. Bird (Boston Concrete Corp., Boston, Mass.).
Alexander F. Foster, Jr. (Warner Co., Philadelphia, Pa.).
J. L. Shiely (Guaranteed Concrete Co., St. Paul, Minn.)
H. F. Thomson (General Material Co., St. Louis, Mo.).

Associate Members

S. A. Phillips (PIT AND QUARRY, Chicago, Ill.).
N. C. Rockwood (*Rock Products*, Chicago, Ill.).

An early morning fire caused $3,000 damage at the plant of the Grohne Concrete Products Co. at Decatur, Ill., recently. The blaze originated near two acetylene storage tanks and when these exploded the flames spread.

Editorial

Legislation or Mechanics

THE fact that damage suits based on cases of real or alleged silicosis have assumed huge proportions is the occasion of much discussion, not only among the producers of materials which present the silicosis hazard in varying degrees but also among those makers of equipment who will probably ultimately be responsible for reducing or eliminating the evils. In speaking of evil in the plural form we refer not only to the ravages of silicosis as an impairer of health and a taker of human life, but also to the high costs of silicosis damage suits which are placing an intolerable burden on some of our industries.

It was inevitable that the silicosis hazards present in the production of certain types of minerals should become onerous. It was inevitable, too, that the damages awarded to real victims of the disease should attract the attention of unscrupulous lawyers who are ever ready to commercialize situations of this kind and that employers should themselves become the victims of spurious claimants. The latter aspect of the situation has become alarming, in the view of the employers, and calls for some relief, possibly through protective legislation.

The silicosis hazard is a serious one, whether viewed from the standpoint of the worker or from that of his employer. It levies a heavy toll on human life among certain classes of labor and so passes on its burden to business. Yet, apparently very little is being done to reduce or eliminate it, in spite of the fact that, considered from the monetary cost alone, the hazard places a very heavy direct tax on business. Apparently more is being done in the direction of obtaining legislation to temper the damage claims of genuine and alleged victims of the disease than in an effort to prevent the development of the disease. Curative rather than preventive measures seem to be looked upon as the likeliest and most immediate source of relief.

We are not very hopeful of the legislative way out of the difficulty. Existing legislation and the common law already fix the employer's legal responsibility and there does not seem to be much likelihood of altering that situation in the direction of lightening the weight on the employer. The tendency in legislation of this kind is toward a strengthening and a broadening of the claims of the worker rather than toward a weakening and a narrowing of them. Legislation that would tend to limit or remove the employer's responsibility for cases of silicosis developing in his workers as the result of their employment on his work would be in direct opposition to the trend of legal thought and practice in such matters.

In our opinion the chief hope for relief lies in the mechanical approach to the problem. We realize that there is no complete and always satisfactory preventive available, but there are appliances that, even if they do not remove the hazard, certainly reduce it. The employer who provides for his workers the best the market affords in equipment of that kind certainly can not be proved to be indifferent to the welfare of his workers, even if those appliances provide only a modicum of protection. And even if the workers refuse to use the equipment provided for them, the employer who makes them available materially strengthens his moral position in defending any charge of negligence that may be raised against him. In any claim based on equity moral strength is a large factor in winning a decision.

The legal possibilities of providing relief from the costs of silicosis have about been exhausted; the mechanical possibilities have barely been touched. Given the proper encouragement, safety-appliance manufacturers can solve the problem satisfactorily and at reasonable cost. Such encouragement, in the form of general purchase of available equipment or in that of offering prizes for the design of suitable appliances, has not yet been sufficiently common to produce the results desired. Until some such stimulus is provided, adequate relief will not be forthcoming.

Inventions and "Bad" Times

THOSE who have a faculty for recalling the similarities between this and similar periods of "poor" business remind us that at all such times inventive genius has shown an astonishing increase. And those who like to pick on fanciful explanations to account for seemingly inscrutable facts fall back on the time-worn phrase that "necessity is the mother of invention."

The fact that the number of patents issued by and the number of applications on file at the United States Patent Office during the last six months are greater than during any similar period in the department's history is seized upon by the *Wall Street Journal* as the occasion for remarking that "it seems that unemployed men are using their enforced leisure to perfect mechanical devices of all sorts." Thus painting an attractive picture of the great mass of jobless rushing into the field of invention as a sure way out of the distressing conditions of unemployment. The facility with which untrained and ungifted men are thus able to rush into the breach—in the view of the *Journal*—is similar, it seems to us, to the astonishing ease with which a million men, in the fanciful mind of William Jennings Bryan, would be able to spring to arms. In the opinion of some people, the versatility of the average American is boundless, provided only that he have the necessary spur to urge him forward. It is the same faith that leads the bank messenger to essay banking and the boot-black to turn shoe manufacturer, with the results so accurately and unsympathetically recorded by the commercial agencies.

The fact that inventive genius shows greater activity during times like these is probably to be explained by the unusually great amount of development work undertaken by manufacturers of all kinds. When the problem of meeting the demand for his products disappears under the stress of slack business and when the shrinking profits of competitive price-wars make the discovery or invention of new processes and new materials essential to survival, the manufacturer's attention is forced upon the necessity for improving or cheapening his products in order to hold his share of the business available. There are few plants where this process of seeking new and better ways of doing things has not been going on at a greatly accelerated pace since business has declined. As long as sales can be made easily and products can be sold without much discussion of price there is little incentive to improve those products or to devise cheaper methods of producing them, but the moment there comes a slump in buying or a more skeptical attitude toward prices and values, attention is again centered on technical betterment of those products and on an attempt to offer more genuine value for the prices asked.

This is happening in our industries as in all others, more particularly among the makers of the equipment used by our industries. The greatest advances made in the production of any type of product come as the result of the striving of equipment makers to better their products, and now—when to the normal competitive urge is added that of business necessity—these improvements are certain to be of great importance. There is scarcely an equipment maker supplying our industries who is not busily engaged—and who has not been so occupied for at least two years—in making a critical study of his products, simplifying them, removing excess weight, reducing the friction between their moving parts, increasing their output or making it more uniform, and in numerous and widely different ways making those products more suitable for the purposes to which they are applied, less expensive in first cost or in power consumption, or longer-lived.

The work of hundreds of engineering and development departments has added thousands to the number of applications for patents on new methods and new forms of construction that are flooding the patent office. And, by reason of this activity, buyers of equipment are in a more favorable position than ever before to obtain at reasonable costs the best engineering, the most advanced methods, the latest technique that have ever been offered them. Alert producers are taking advantage of the opportunities so presented and are fitting themselves in this period of slack business for the strenuous competition of intelligence and skill of the prosperous period to come.

Wall Street Journal Sees Hope in Cement-Price Stability

"A more hopeful feeling as regards the price situation exists in the Portland-cement industry, although the effect of foreign importations still exerts a malign influence on the Atlantic seaboard," declares the *Wall Street Journal*. "Producers who in the past practically disregarded the price factor in order to keep their mills going at the highest possible capacity are now adhering to the current list quotation. There have been no reductions in price by eastern manufacturers since May, 1931, when the record low for the past 15 years was established. In the West quotations have been somewhat irregular due to sharp competitive bidding on road work and other public improvements.

"Since March shipments showed a decrease of 44.8 per cent. from a year previous, with production at 21.3 per cent. of capacity, cement producers see little probability of an upturn in prices in the near future. Orders from construction contractors are light, reflecting the curtailment of building operations throughout the country. The demand from road builders is showing a marked falling off in line with the policy of the different states to economize on public expenditures to minimize taxes.

"The current low quotation for cement is the direct result of a price war that began toward the close of 1930. During the first five months of 1931 five cuts were made.

"In the New York City territory these reductions aggregated 40 c. a bbl., bringing the price to $1.54 a bbl., packed in paper containers and less all discounts, comparing with $1.94 a bbl. on January 1 of that year. The Chicago quotation declined by 46 c. to $1.40 a bbl. and the Albany price declined by 50 c. to $1.58 a bbl. during that period.

"The price war was the culmination of two years of declining demand and keen competition. Toward the end of 1930 the larger producers who had been attempting to stabilize conditions in the industry by adhering to a one-price policy were forced to the realization that their efforts were in vain. As a matter of self-preservation they were compelled to go after business in a more aggressive manner and meet the competition offered by the smaller concerns who had been shading the list quotation and thereby getting more than their pro rata share of the business available.

"With foreign importations continuing to be an annoying factor on the Atlantic seaboard some producers believe it may be necessary to establish a 'depressed price' in this market to meet the competition. While small in the aggregate, as compared with total consumption of the country, these importations assume importance when they are dumped into a restricted territory.

"Also, they cause dissatisfaction among the local dealers who are forced to meet the competition of the lower priced foreign product. If the 'depressed price' policy is adopted in the larger importing centers, it will be entirely local in scope."

Georgia Leads All States in Production of Asbestos and Fullers' Earth*

Nonmetallic Products Account for Nearly 95 Per Cent. of Annual Value of Minerals

By RICHARD W. SMITH
Asst. State Geologist

GEORGIA annually produces mineral resources to the value of $15,000,000 to $17,000,000, of which about 95 per cent. represents the nonmetallic minerals.[1] Georgia ranks first among the states in the production of asbestos, fullers' earth, and ocher; second in the production of barite and raw clay; and varies between third and fourth place in the production of marble. Of many of the minerals the undeveloped reserves for the future are enormous and the production of the future will be limited only by the market and the progressiveness of the producers. For example, the sedimentary kaolins of Georgia are just beginning to be fully known to the consumers and the production has shown a steady increase.

The following descriptions of the individual minerals are necessarily brief. Further information may be gained from the publications of the Geological Survey of Georgia listed in the foot-notes, or by writing direct to the state geologist. The accompanying map (Fig. 1) marks the principal deposits.

Asbestos.—Short-fiber asbestos of the fibrous anthopyllite variety has been mined near Cleveland in White County and, for a short time, at Hollywood, near Clarkesville in Habersham County. The asbestos occurs in veins or masses in partly altered peridotite. The small amount now mined in Georgia is used in the manufacture of insulation of various kinds.[2]

Barite.—The Cartersville district of Georgia, in recent years, produced over a third of the barite mined in the United States. The production for the last three years follows (U. S. Bureau of Mines figures):

Barite Sold in Georgia

Year	Quantity (short tons)	Value
1928	112,316	$675,509
1929	96,668	560,084
1930	41,746	230,769

The barite occurs as residual and colluvial deposits derived from the weathering of the Shady limestone of Cambrian age, which at places contains veins of barite.[3] The deposits are intimately associated with ocher and manganese ore, although it is seldom that more than one of these minerals can be mined from the same pit. The residual clay, containing fragments of barite, is mined by steam shovel, loaded into tram cars, and hauled to a washing plant located near a water-supply and transportation. The washing process consists of the elutriation and removal of the clay in log-washers, followed by a revolving screen, the oversize going to a picking belt and the undersize to jigs for the removal of rock fragments (Fig. 2).

Cement.—Adjacent deposits of limestone and clay suitable for the manufacture of Portland cement are found at a number of places in northwest, middle, and south Georgia.[4] Three plants have been erected for the production of Portland Cement in Georgia. Two of these, near Rockmart in Polk County, northwest Georgia, use the Chickamauga limestone and the overlying Rockmart slate of Ordovician age (Fig. 3). The third, near Perry in Houston county, middle Georgia (Fig. 4), uses the Ocala limestone of Eocene age and a sedimentary kaolin of Cretaceous age from a pit about eight miles north of the plant. The combined production of these three plants is given below.

Portland Cement Produced in Georgia

Year	Quantity (bbl.)	Value
1928	1,346,357	$1,747,263
1929	1,117,532	1,432,742
1930	1,047,857	1,686,024

Clay.—The clay resources of Georgia[5,6] consist of: (1) large beds of sedimentary kaolin in middle Georgia; (2) deposits of excellent alluvial clay in the valleys at Fall Line in middle Georgia; and (3) large deposits of shale in northwest Georgia.

The sedimentary kaolins of Georgia are found in the Cretaceous (Tuscaloosa) and Eocene (Midway) formations. The Cretaceous extends across the state from Columbus to Augusta in a belt 5 to 30 mi. in width. The most important kaolin deposits occur near the middle of this belt in Twiggs, Wilkinson (Fig. 5), and Washington Counties, although scattered deposits are found in some of the other counties. The Midway formation of Eocene age overlies the Cretaceous in the western part of the state, and contains sedimentary kaolins generally inferior to those of the Cretaceous. The kaolins occur in the form of lenses ranging in thickness from a few inches to a maximum of 50 ft., and in horizontal extent from a few square yards to

* Published by permission of the Georgia Department of Forestry and Geological Development. Photographs by the Georgia Geological Survey.

[1] McCallie (S. W.), *Mineral Resources of Georgia.* Rev. ed., 1926.

[2] Hopkins (O. B.), *Asbestos, Talc and Soapstone Deposits in Georgia.* 1914.

[3] Hull (J. P. D.), *Barytes Deposits of Georgia.* 1920.

[4] Maynard (T. P.), *Limestones and Cement Materials of North Georgia.* 1912.

[5] Smith (R. W.), *Sedimentary Kaolins of the Coastal Plain of Georgia.* 1929.

[6] Smith (R. W.), *Shales and Brick Clays of Georgia.* 1931.

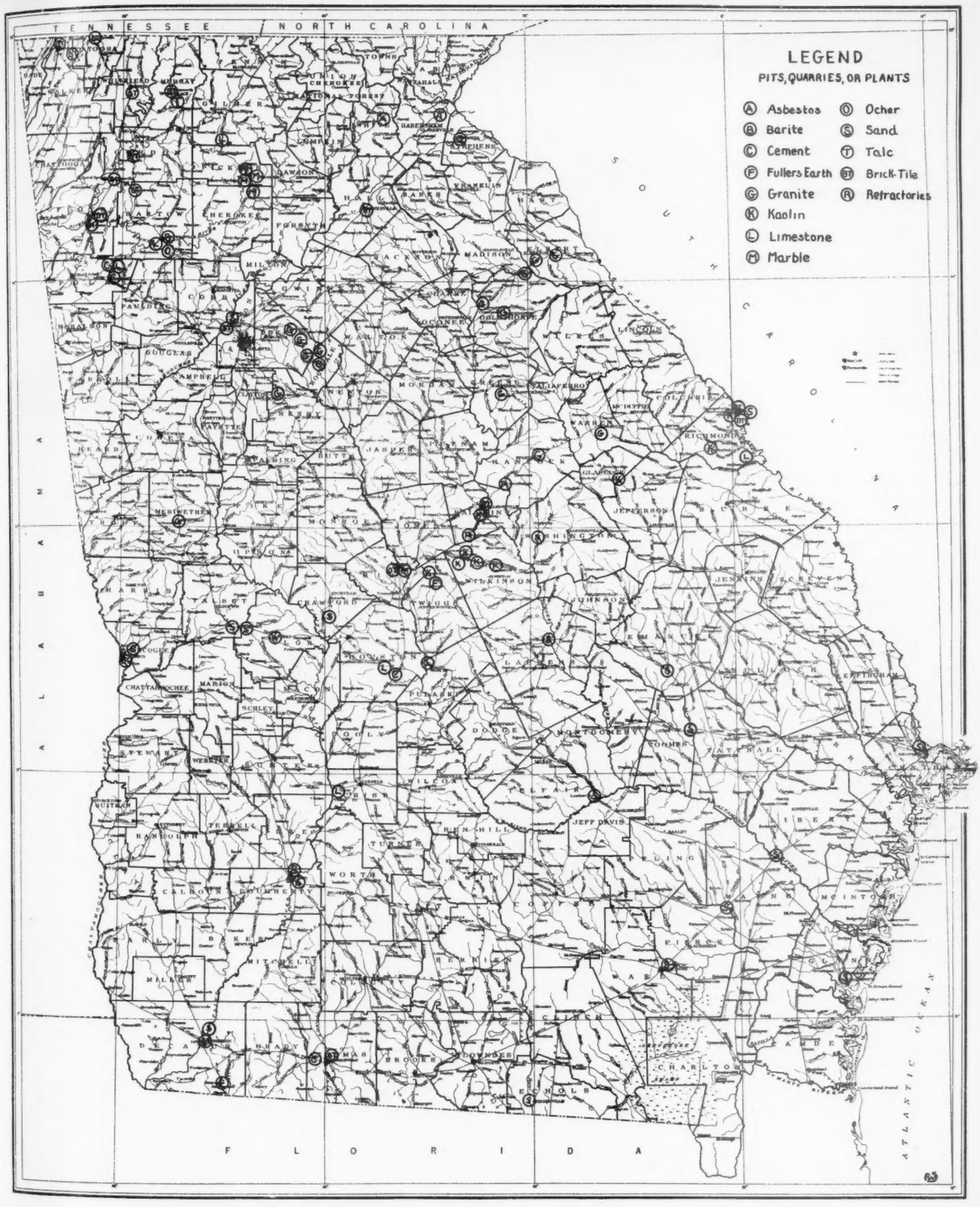


Fig. 1. Map of Georgia showing location of the important nonmetallic-mineral operations.

many acres. They are interbedded with white to vari-colored sands. The kaolin is notable for its whiteness, purity, and its massive character. In general it is comparatively free from grit, but some contains much quartz sand and mica and grades laterally and downward into kaolinitic sands.

The sedimentary kaolins of Georgia are by no means uniform in physical properties, although the range in composition falls within somewhat narrow limits. Their hardness ranges from that of the very soft clay to that of flint clay. Their color ranges from cream and light-gray to white. At places they have been altered to bauxitic clays and bauxite. The soft and semi-hard varieties (Fig. 6) have long been used as fillers, principally in the manufacture of paper but also in the manufacture of oilcloth, rubber, and other products. Their use for this purpose is steadily increasing with im-

Fig. 2. Paga barytes mine No. 1 near Cartersville, Bartow County.

provements in the methods of mining and washing. Within the last few years chemically-treated Georgia kaolin has replaced about half of the high-grade paper-coating clays formerly imported. The soft and semi-hard kaolins are also increasingly used in the manufacture of white ware and locally in the manufacture of refractories. The hard, bauxitic, and flint varieties are under present conditions suited only for the manufacture of refractories.[7] The following production of raw clay in

Fig. 3. Plant of Southern States Portland Cement Co. near Rockmart, Polk County.

Georgia does not include the kaolin manufactured into refractories.

[7] Shearer (H. K.), *Bauxite and Fullers' Earth of the Coastal Plain of Georgia*. 1917.

Raw Clay Produced in Georgia

Year	Quantity *(long tons)*	Value
1928	249,604	$1,687,654
1929	288,490	2,098,891
1930	289,880	2,061,208

Columbus, Macon, Milledgeville, Augusta, and Atlanta are centers for the manufacture of building brick and structural tile from alluvial river-terrace clays. The shales of Northwest Georgia, ranging in age from Cambrian to Mississippian, are used

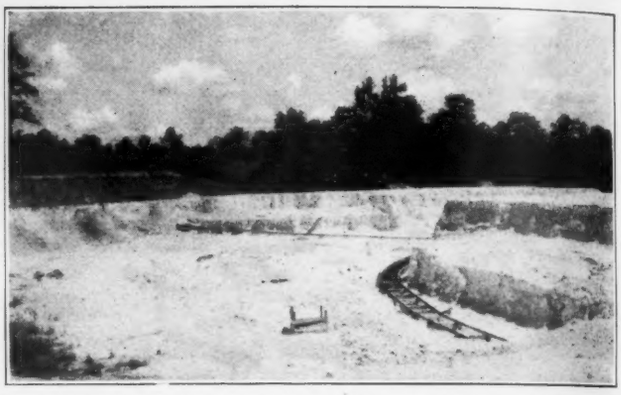


Fig. 5. Kaolin pit of Akron Pigment Co. at McIntyre, Wilkinson County.

in the manufacture of building brick, sewer pipe, and roofing tile.

Clay Products Manufactured in Georgia

Year	Value
1928	$3,674,965
1929	3,687,941
1930	2,474,111

Fullers' Earth.—Georgia produces more fullers' earth than any other state in the Union.[7] The production has shown a steady increase in the last few years and in 1930 was valued at almost $2,000,000. Two kinds of fullers' earths from two separate and distinct geologic horizons are utilized.

Deposits of fullers' earth in the Barnwell formation of Eocene age are found in Twiggs, Wilkinson, and other Counties near the Fall Line in middle Georgia. This type is mined near Pike's Peak in Twiggs County (Fig. 7) for use in the refining of vegetable oils, for which purpose it is dried and pulverized. A unique method of drying the earth

Fig. 4. Composite view of plant and quarry, Pennsylvania-Dixie Cement Corp., at Clinchfield, Ga.

was adopted after unsuccessful attempts to use rotary driers. The material is formed into bricks by an ordinary stiff-mud auger brick-machine. These bricks are stacked on drier cars and there dried for 3 or 4 days at a temperature of about 120 deg. F. in tunnel driers. The high drying shrinkage of the clay causes the surface of the bricks to crack as they dry, exposing the still moist inner portions, which in turn dry and crack.

The other type of fullers' earth is found in south Georgia near Attapulgus in Grady County (Fig. 8) and belongs to the Hawthorn formation of Miocene age. It is harder than the middle Georgia variety and is dried in rotary driers and granulated for use in the refining of petroleum oils.

Granite.—The quarrying of the granites and gneisses of Georgia is confined to the Piedmont Plateau.[8] The principal centers of the industry are at Stone Mountain, Lithonia, Elberton, Lexington, Sparta, Warrenton, and Odessa. The Stone Mountain granite is a light-gray medium-grained mus-

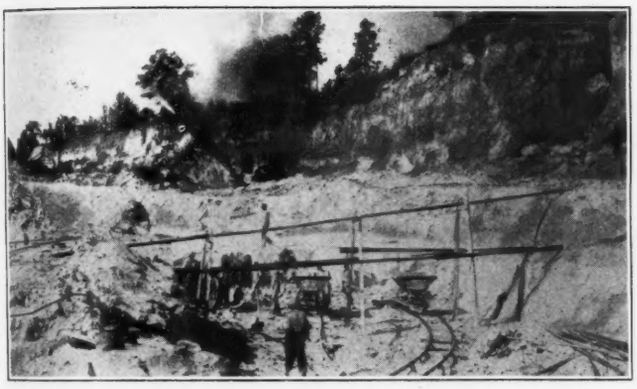


Fig. 6. Working face at Albion Kaolin Co. pit at Hepzibah, Richmond County.

covite granite used principally as a building stone and for paving and curbing stones. The granite gneiss of the Lithonia district is used for curbing and paving and is crushed for aggregate. The gray and blue biotite granites quarried near Lexington and Elberton are excellent for monumental as well as building stone.

Two large quarries, one at Rock Chapel in DeKalb County (Fig. 9) and the other at Warrenton in Warren County, produce nothing but crushed stone for concrete aggregate and railroad ballast.

[8] Watson (T. L.), *A Part of the Granites and Gneisses of Georgia.* 1902.

Fig. 7. Fullers'-earth pit at Pikes Peak, Twigg County, operated by General Reduction Co.

The granite production of Georgia for 1928 to 1930 is given below. The total value for 1930 was divided among the various uses as follows: Building stone, 21 per cent.; monumental stone, 27 per cent.; paving, curbing and flagging, 36 per cent.; and rubble, riprap, railroad ballast, and concrete aggregate, 16 per cent.

Granite Quarried in Georgia

Year	Quantity (tons)	Value
1928	415,830	$2,275,232
1929	493,670	2,151,354
1930	456,800	1,996,934

Limestone.—Commercial deposits of limestone are found in the Appalachian Valley region of northwest Georgia and the coastal plain of middle and south Georgia.[9] In addition, the Piedmont Plateau contains a few scattered deposits of marble which, in addition to its use as a building stone as described later, can be used as a limestone.

The limestones of the Appalachian Valley region are semi-crystalline bedded deposits. They are found in the Shady limestone and Conasauga formation of cambrian age, the Knox dolomite of Cambro-Ordovician age, the Chickamauga formation of Ordovician age, and the Bangor formation of Mississippian age. They are used in the manufacture of lime and for road material, railroad ballast, and concrete aggregate.

At Whitestone in Gilmer County a very white somewhat dolomitic marble is crushed for use in terrazzo floors, in stucco, in cast stone, in road construction, as chicken grit, and as a metallurgical

[9] Brantly (J. E.), *Limestones and Marls of the Coastal Plain of Georgia.* 1917.

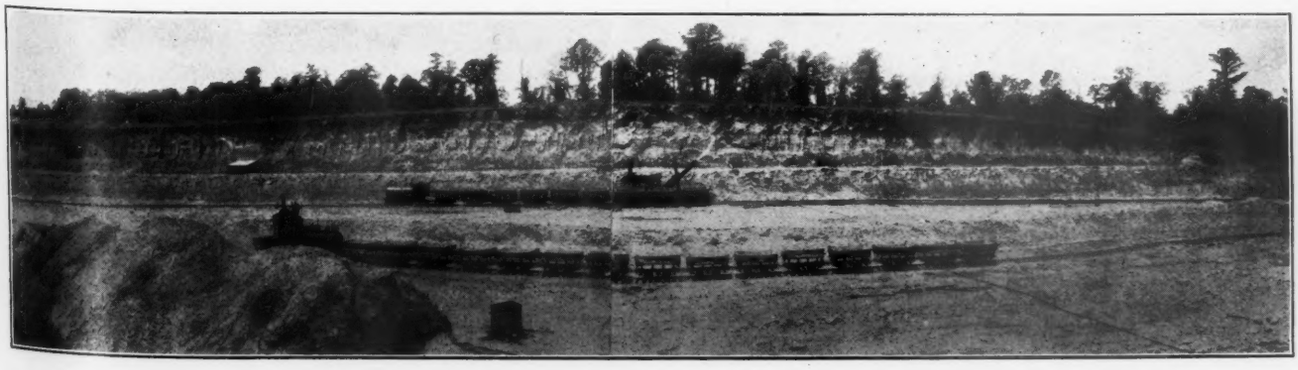


Fig. 8. Fullers'-earth mine of the Attapulgus Clay Co. in Grady County.

flux, and is pulverized for use as a filler for asphalt and fertilizer, as agricultural limestone, for dusting coal mines to prevent coal-dust explosions, as whiting, and by sulphuric-acid manufacturers to neutralize certain waste products. A limited amount of the waste incidental to the quarrying of the Georgia marble of Pickens County is used for similar purposes.

Limestone, usually more or less unconsolidated, is found in several formations of Eocene age in the coastal plain of Georgia. The Ocala limestone, made up largely of unconsolidated fragments of bryozoa and other shells (Figs. 10 and 11), is mined at a few places south of Macon and is used as a road material. The material is spread on the road and compacted by scraping and rolling to form a

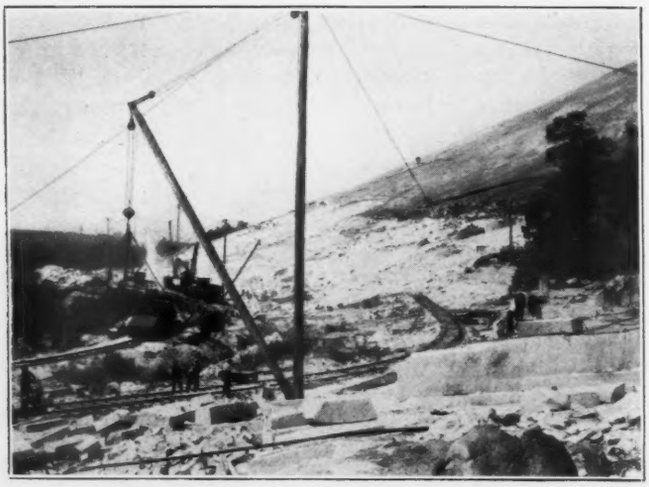


Fig. 9. Stone Mountain Granite Co. quarry at Stone Mountain, east of Atlanta.

layer 8 in. in thickness. Tar is then sprayed on and allowed to penetrate, followed by a top surface of asphalt and finely-crushed rock. The result is an economical road of excellent quality and, with proper maintenance, of long life. A surface dressing is required about once in three years.

Limestone Quarried in Georgia

Year	Quantity (tons)	Value
1928	540,060	$649,514
1929	401,320	488,700
1930	315,850	378,060

Marble.—The Georgia marble of Pickens County

Fig. 10. Quarry of the Georgia Lime Rock Co., Perry, Ga.

(Fig. 12) has long been famous for monumental purposes and as a building stone.[10] It is exceptionally suited for exterior work, but is also used to a considerable extent for interior finish. The production is all by one company, which operates nine quarries with a total annual capacity of a little over 1,000,000 cu. ft., valued at several million dollars. The reserves for the future appear to be

Fig. 11. Georgia Lime Rock Co. plant at Perry, Houston County.

practically unlimited. The principal varieties quarried are:

Georgia White, a coarse-grained marble of an almost pure white color and possessing a sparkling luster. It is largely used for exterior work, interior finish, and monumental purposes.

Cherokee, a coarse-grained grayish-white marble that differs from the Georgia White in possessing

Fig. 12. Quarrying marble at Tate, Ga., Georgia Marble Co.

a grayish tone and a remarkable degree of translucency. It is used for monumental work and as an exterior and interior building stone.

Creole, a mottled dark-gray and white variety, somewhat finer-grained than most of the other varieties, the dark portions forming straight, curved, or intricately interlacing patterns. It is largely used for monumental purposes, for exterior trim and interior finish.

Etowah, a medium-grained old-rose to deep-pink marble with enough greenish-black and gray veins and splotches to relieve the monotony, used prin-

[10] McCallie (S. W.), *Marbles of Georgia.* Rev. ed., 1907.

cipally for interior finish and ornamental purposes.

Mezzotint, a combination of a silver gray background and contorted streaks and irregular blotches of a light purplish-gray color, much used for interior work and also in large buildings in which the nearly pure white of the Georgia White marble is not desired.

Fig. 13. Grinding plant using white dolomitic marble near Whitestone, Gilmer County.

Rosepia, a fine-grained magnesium marble of a white color marked with amber streaks and scattered amber spots, principally used for interiors.

A few of the outstanding examples of the use of Georgia marble are: the Buckingham Foundation and the Field Museum, Chicago; the new Department of Agriculture building at Washington; the capitol of Porto Rico, and the state capitols of Minnesota and Rhode Island.

Fig. 16. Mining sand hydraulically in Atlanta Sand & Supply Co. pit at Gaillard, Crawford County.

Mica.—Sheet mica has been sporadically mined at various places throughout the Piedmont Plateau, the height of the production having been reached in 1918 when mica valued at $80,050 was produced. The pegmatite dikes or veins in which it is found are usually small and the mica within the veins pockety in occurrence. The quality, however, is usually excellent, most of the mica being absolutely flat and of the "ruby" or "rum" color most desired. The mining has for the most part been done by the property owners and with methods that recovered only a small part of the mica (Fig. 15).

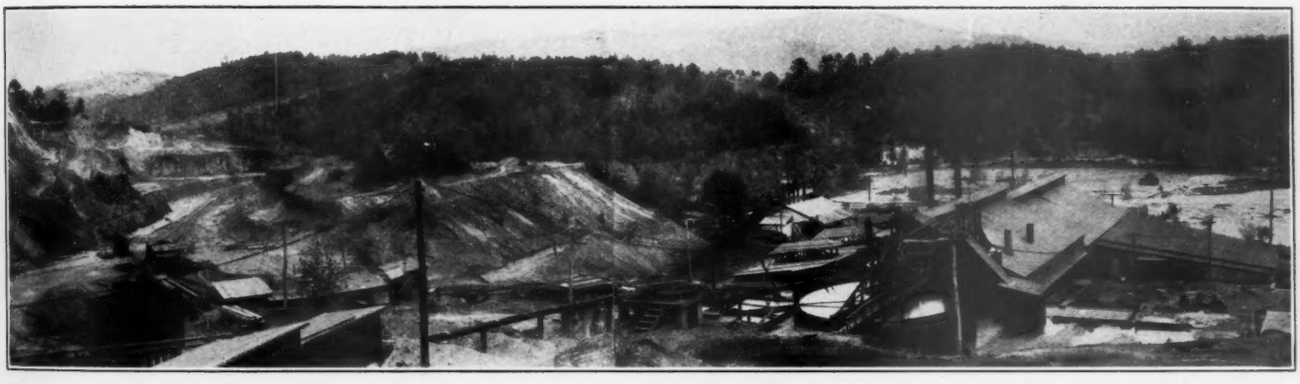


Fig. 14. Panorama of mine and grinding plant, New Riverside Ocher Co., near Cartersville, Bartow County.

Fig. 15. Mining mica south of Thomaston, Upson County.

Ocher.—Ocher has been mined from the Cartersville district of Georgia since 1877.[11] It occurs as replacement deposits in the Weisner quartzite near the contact with the Shady limestone, both of Cambrian age, and in the overlying residual clays (Fig. 14). The ocher from the quartzite is a bright golden-yellow color, but that in the overlying clay is usually of a darker color and of inferior quality. The ocher is usually mined in open pits, but one company has used underground methods in workings extending below water-level. The washing process begins with a preliminary treatment in log-washers which remove the accompanying sand and rock fragments and put the ocher and clay in suspension. This is followed by some form of free or hindered settling to remove the clay from the ocher, which is then dewatered and dried. The

[11] Watson (T. L.), *Ocher Deposits of Georgia*. 1906.

production from the district has been as much as 16,000 tons a year, although it has been greatly curtailed in the last few years.

Sand and Gravel.—Deposits of sand and gravel are abundant in the coastal plain of Georgia and are found along many of the streams in the other parts of the state.[12] The sand-and-gravel deposits of the coastal plain are of three types in regard to method of origin: (1) River-bed and terrace de-

Fig. 17. Tift Hill sand pit on Flint River near Albany, Ga.

posits, such as those worked at Augusta, Macon, and Columbus; (2) bedded deposits of Cretaceous and more recent age, such as are found at places just south of the Fall line and are extensively worked near Junction City in Talbot County, Howard in Taylor County, and near Gaillard in Crawford County (Fig. 16); and (3) æölean deposits or wind-blown dunes, such as the deposit worked near Albany in Dougherty County (Fig. 17). Considerable sand and gravel is shipped from the deposits mentioned above to the other parts of the state. Molding sand is produced at several localities and glass sand has been shipped from near Lumber City in Telfair County. The following production figures reported by the sand-and-gravel companies of Georgia do not include the large amount of sand and gravel recovered by consumers from local deposits.

Sand and Gravel Production in Georgia

Year	Quantity *(tons)*	Value
1928	744,948	$310,567
1929	604,611	235,299
1930	586,929	228,396

Talc and Soapstone.—Talc and soapstone are found at a number of places in north Georgia, but have been mined to any extent only in the foothills of Cohutta Mountains near Chatsworth in Murray County. The material is sub-crystalline to crystalline and occurs as lense-shaped masses in what appears to be an elongated body of altered peridotite. The talc is mined by underground methods and transported in carts and trucks to mills at Chatsworth, where it is sawed into pencils for foundry marking or ground for use as a foundry facing, filler, and other purposes. The district has in re-

[12] Teas (L. P.), *Sand-and-Gravel Deposits of Georgia.* 1921.

Fig. 18. Shale pit of Plainville Brick Co., Plainville, Gordon County.

cent years produced from 3,000 to 5,000 tons valued at from $85,000 to $150,000.

Tripoli.—Small deposits of tripoli are found in Walker, Murray, Whitfield, Chattooga, and other counties in Northwest Georgia. The deposits are the result of weathering and alteration of certain siliceous beds or pockets of the Knox dolomite of Cambro-Ordovician age. Several hundred tons was mined in 1929 and 1930 from a deposit near LaFayette in Walker County. The material is said to have been used in the manufacture of polishing powders and scouring soaps and as a filler.

Austrian Magnesite Output Slumps

The total Austrian output of raw magnesite, crystalline and amorphous, during 1931 is estimated at 179,440 metric tons, compared with 304,396 tons during the preceding year, a decrease of 41 per cent. More than 83 per cent. of the 1931 output—148,840 tons, chiefly of the crystalline variety—was produced by the two leading companies. A considerable number of shares of one of these companies, the Veitscher Magnesitwerke A. G., formerly held by a leading Austrian bank, were sold to a foreign group during the year, and other important changes in ownership of domestic magnesite companies were reported.

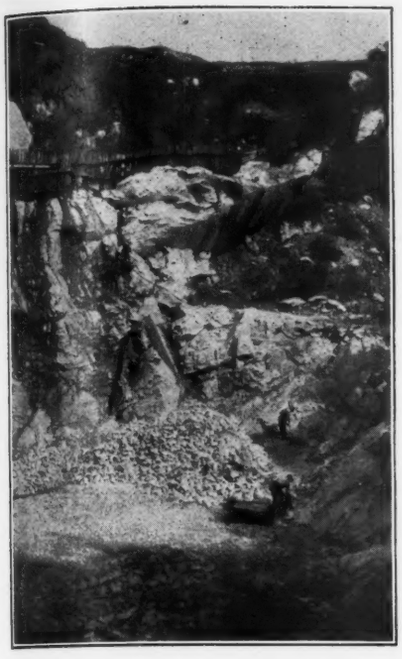
Since dead-burned magnesite was produced in 1931 only by the two leading companies, their combined total output of this variety, 38,799 tons, represents the total Austrian production for the year, a decrease from the 1930 figure of 124,226 tons burned. Veitscher was responsible for 25,799 tons of the 1931 production.

Production of caustic calcined magnesite showed an upward trend in 1931. The total output is estimated at 34,760 tons, compared with 20,500 tons in the preceding year, an increase of 18 per cent. More than 63 per cent. of the total was produced by one company.

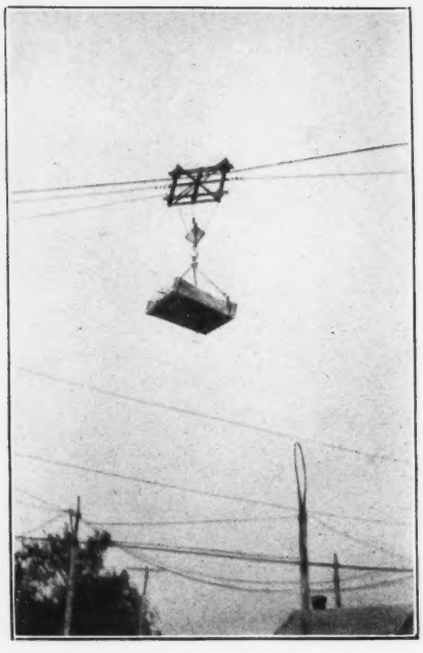
In 1931 23,817 tons of magnesite brick was produced as compared with 41,083 in the preceding year. The dead-burned magnesite from which these bricks were manufactured is included in the production statistics for that variety.

Austrian exports of raw magnesite, insignificant

(*Continued on page 34*)



Looking across the working face.



Aërial tramway and stone box.

Sorting stone in the quarry.

Carries on Traditions of Rhode Island Ancestors in Making of Lime

First Kilns on Site Were Fired During Struggle of Colonies for Independence

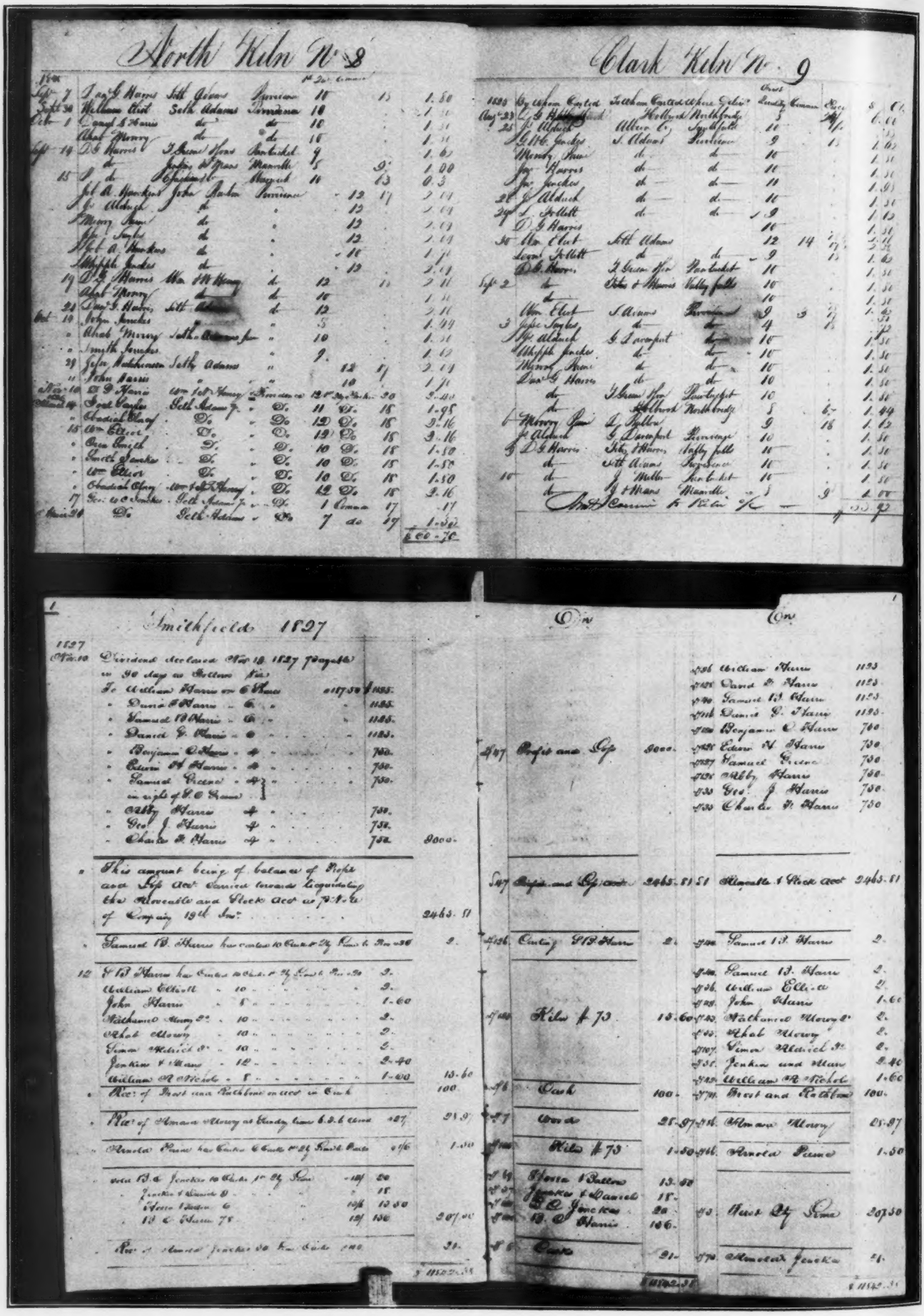
FIFTEEN years after the Pilgrims landed at Plymouth Rock and proceeded to settle Massachusetts Bay Colony on the present site of Boston, Roger Williams was banished from the colony for his preachings which urged the separation of Church and State. Gathering a band of 36 others who subscribed to his beliefs, the intrepid Williams and his band wandered southward and finally settled in the peaceful and fertile spot near what is now known as Providence, R. I. Among Williams' followers who formed the new colony were Thomas Harris, William Harris, and John Dexter.

Observing the apparent high quality of the limestone outcroppings in the vicinity, the Harrises and Dexter turned their attention to the production of lime and soon began turning out material sufficient for the building needs of their fellow colonists. Since that time in the dim past, the names of these families have been inseparably linked with lime-making in what has proved to be the cradle of the American lime industry.

From the early records of Providence and Rhode Island we learn that ". . . the Harris limerock is usually known by the name of Jointer (Jointa), a name derived from the joints in the rock ledges." The Dexter rock, the records point out, was of similar formation.

More than a century passed and New England became more thickly settled. The War of the Revolution established independence for the colonies. The Indians were driven farther west and became less of a menace. The close of the War of 1812 saw a construction boom and the lime industry experienced genuine activity. The Harris and Dexter lime plants, now situated in the thriving village of Lime Rock, began producing abundant quantities of high-quality lime. It is of interest to note that Dr. Charles T. Jackson, in a survey of Rhode Island made in 1839, pointed out, in connection with these industries, that "an attempt is being made at the Harris quarries to burn lime by the use of anthracite coal, but without success, due probably to the want of skill in the persons employed. The lime kilns are very large and are built so as to contain 500 casks of lime. In operating upon so large a mass of limestone, the fire is driven for seven days and seven nights incessantly, a good draft being kept up by means of an ash-pit opening with a grate of bar iron; a large iron fire-door being closed after each addition of fuel. These kilns are vastly more economical, as regards fuel, than those used at Thomaston, Me. The lime is remarkably white and slakes to a very strong hydrate of lime. The magnesium limestone, a hard rock, is aid to produce a lime generally preferred by masons, since the mortar hardens sooner than if made of pure lime."

Regarding the Dexter operations, Dr. Jackson reported: ". . . there are two lime kilns in use, each of which contains 500 casks of lime. No less than 10,000 casks have annually been sold during



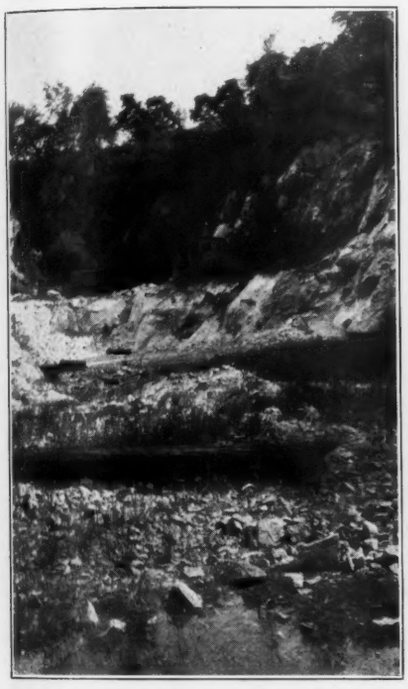
Mr. Harris has many interesting old records of the lime operations of his ancestors. Above are reproduced pages from the cartage book with entries in the year 1825, and (at the top) record pages from the kiln book of 1827.

the last forty years. The kilns are 11 ft. in diameter at the top, bulge in the middle to 14 ft. and then contract at the bottom to 8 ft. The height from hearth to top is 21 ft. and the depth from front to rear is 14 ft. at the bottom. Beneath the kiln there is an ash-pit or drop arch which is kept free from ashes by a scraper. During the burning a fire-door above closes the opening when wood is thrown in."

The Harris operations, in passing down through succeeding generations, had been divided by inheritance into such small parcels that it became practically impossible to work the quarries economically. The accompanying reproduction of an old map gives an idea how these lands were divided.

Examination of numerous letters establishes the significant fact that the Harris Lime Rock Co. was incorporated about the same time that preliminary work was begun on the Providence & Worcester Canal which passed within a short distance of the company's quarry. This highway of commerce later enabled the firm to ship its product by water to Worcester and other important markets to the north, and was an important factor in the success of the concern, since carting the lime in wagons over almost impassable roads was inconvenient, costly and always uncertain.

Copies of some of these old letters reveal an interesting picture of the marketing difficulties of



View of the quarry floor.

Burton K. Harris.

The Dexter quarry.

In order to consolidate the workings, the Harris Lime Rock Co. was organized in 1823.

Burton K. Harris, a direct descendant of the original Harrises who came over on the ship *Lyon*, is still in the lime business at Lime Rock, manufacturing the Dexter and Jointa brands of lime on the site of the original lime-burning works. Mr. Harris has in his possession a number of old books recording the business transactions of the Harris Lime Rock Co., shortly after its incorporation in 1823. The most interesting are a journal, ledger, kiln book, carting book, and letter-file books. The kiln book shows cost records for each kiln as fired. Each burning, or batch, was numbered and the record consisted of such items as burning costs, labor, cartage, delivery charges, etc. On the opposite side were listed the total number of casks of each variety of lime produced with the total amount received for the finished product. A balance was struck showing an estimated profit on the burning of each kiln of lime. The carting book shows where each load of lime was delivered, to whom it was carted, together with the number of casks, prices, etc. Reproductions of several pages from these books appear on the opposite page.

that day. Consider the following note, dated July 21, 1848, which illustrates an early example of price cutting to meet competitive conditions:

Draper Clark & Co.:

Yours of 20th instant was received requesting to know if we would reduce our lime $0.32½. We say in reply we will reduce the lime as requested, charging you, delivered at Albion Depot, $1.65½ per cask instead of $1.98, the reduction to take place on the car-load sent this day.

HARRIS LIME ROCK CO.
Sam B. Harris, *Agent.*

High transportation costs are a constant bugbear to the producer and were, even to those pioneers in the industry. The following letter, written April 19, 1847, illustrates the point:

Ira P. Evans:

We have been unable to send your lime until this day. This season we must allow the teams 45c per cask for carting this, owing to the high price of grain together with the great call for teams at this time; the teams are not willing to take the lime to your place short of that price (45c). Therefore you will perceive we have added the 5c to the price of the lime sent you this day.

HARRIS LIME ROCK CO.
Sam B. Harris, *Agent.*

Some of the claims of superiority for the Harris product are set forth in a letter written by Sam B. Harris on March 3, 1845. Evidently the effect of competition was already being felt, for Mr. Harris declares, in the epistle indited to W. and F. Edwards Co.:

> Respecting lime for the coming season we shall be unable to reduce the price, but if you will examine the weight of the last two lots you will find that our lime will weigh more than it did formerly. Respecting the Glens Falls lime, we only wish the consumer to notice the quantity and quality of the two kinds, and if this is done carefully we are not afraid of the result, to say nothing about the work. Let them observe the plastering the next season of the two kinds; the one will never blister, but they must look out for the other! We shall be most happy to supply you with lime the coming season if you should find a call at the old prices.

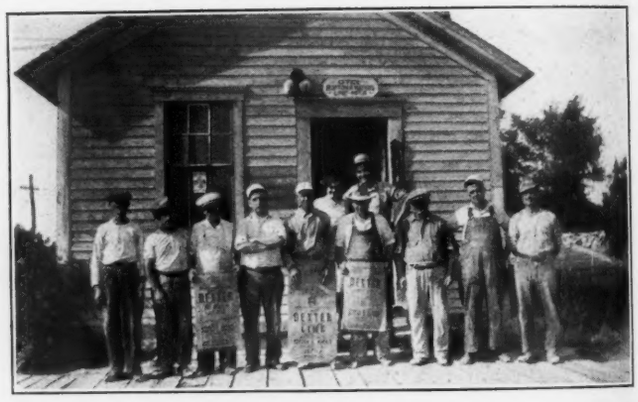
The effect of an approaching presidential election appeared then, as it appears even now, to have a more or less real or imaginary influence on business. Mr. Harris, writing to a manufacturer of casks in 1844 makes the following observation: "What is to be the result of the presidential election? If Clay is not elected business will be almost at a standstill, or in other words the call for lime will be very much reduced. At this time we fear if Polk is elected we shall be unable to do much business the coming season. Our community is a manufacturing community and all depends on the stability of the present tariff."

Despite the fact that Polk was elected the Harris lime business was not endangered, Mr. Harris' fears to the contrary!

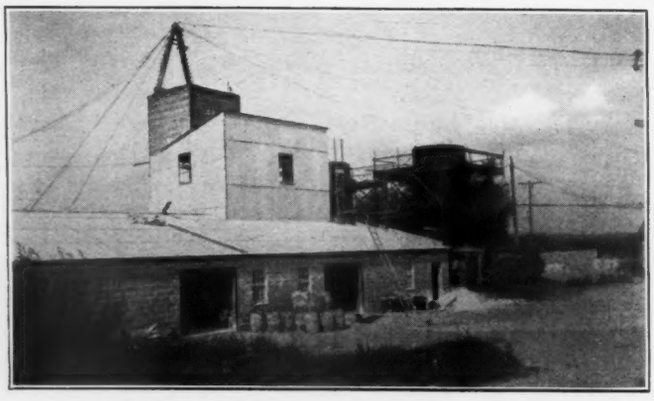
Other letters in the old record books reveal numerous deals involving the exchange of lime for hay, oats and other grains when money was scarce.

About this time a competitor of the Harris Lime Rock Co. sprang up in the village of Lime Rock with the incorporation of the Dexter Lime Rock Co. Both companies continued to operate until about 1890, when the active pursuit of business in each concern ceased and the interests were leased to various individuals. In that year Herbert Harris, father of Burton K. Harris, leased from Robert Harris of Pomfret, Conn., the last descendant of the original proprietors, the Jointa quarry for a period of ten years. At the expiration of that lease he acquired all rights and privileges of the Harris Lime Rock Co. About the same time Thomas Harris, a brother of Herbert Harris, who had been operating the Dexter Lime Rock Co. on lease, died. His widow attempted to continue the operation but in less than a year's time gave it up. In 1901 Herbert Harris purchased the Dexter properties and consolidated the operations. For several years five kilns were in operation at each plant and 56,000 bbl. of lime was produced annually. Another lime plant had been operating over a period of years in Lime Rock under the proprietorship of Theodore Wright, also a descendant of one of the original settlers of Roger Williams' band. In 1909 the James C. Goff Co. of Providence acquired the old Wright operations and immediately sold its interests to Herbert Harris. Thus, all the limestone workings in that vicinity came, for the first time, under the control of one individual. The present owner, Burton K. Harris, took over control of the properties from his father in March, 1919.

On November 22, 1924, the Burton K. Harris plant suffered a severe loss by fire in which a lime shed, the cooperage shop, the hydrating plant, and the crushing plant were burned to the ground. A year later fireproof buildings of steel and concrete had risen and production was resumed. The operation was electrified in 1926 and a pulverizing plant and additional equipment went into service, making the plant comparatively modern and yet one of the best-known in the vicinity.

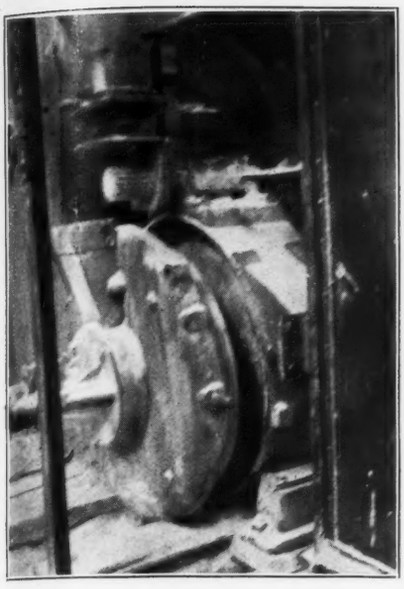


Some of the plant and quarry employees. Burton K. Harris standing in doorway.

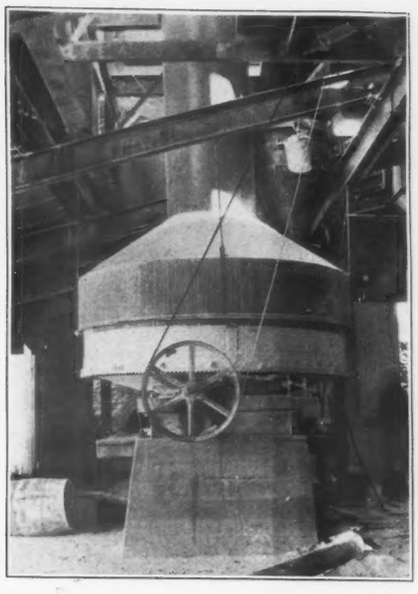


A general view of the lime shed and kilns.

The traditions of two hundred years in the lime business have left their stamp on the present owner, Burton K. Harris. All finished products must be of the highest quality and the company numbers among its customers some of the men whose ancestors bought Jointa lime in the early days. The quarry now being operated is 115 ft. deep, 800 ft. long, and 300 ft. wide. Stone is broken by Ingersoll-Rand Jackhamer drills and Atlas explosives are employed in blasting. All the handling and sorting of the stone is accomplished by hand labor on the floor of the quarry. An aërial cableway, powered by an electrically-operated Lock-Miller cableway engine, transports the material to the plant, steel boxes which carry slightly more than a ton of stone each being used. The stone, having already been carefully selected at the quarry, is immediately charged into the kilns.



Left—Emery mill used to pulverize lime to a high degree of fineness.



Right—A 3-in. addition to the pan of the batch hydrator increased its production 50 per cent., according to Mr. Harris.

There are 3 kilns, each being of local design, and they have been in service since 1902. Each has a steel shell lined with refractory brick and is 35 ft. high and 11 ft. in diameter. Wood is used almost exclusively for fuel, although, at infrequent periods when a sufficient supply could not be obtained, coal has been employed. The basis of the kilns are enlarged and contain arches for ease in firing with wood. The fuel ratios obtained in production compare closely with those established by the Geological Survey Report of 1930, which gives a figure of 3,397 lb. of lime per cord of wood burned.

The burned lime is drawn by hand to a brick hearth where it is allowed to cool. It is then broken, inspected and sorted ready for packing, or for further processing. Fine-grained white lump lime is packed in steel drums of 180-lb. capacity and is marketed under the old-established brand of "Dexter Jointa." Most of this output finds its way to the chemical markets and to marketers of whitewash. Dexter Jointa is also sold in a finely powdered form in small, 2-lb. containers. Glass jars are used to package the product to insure the contents against deterioration by moisture.

The lime which is known as Dexter First Quality is shoveled direct from the hearth floor into two sizes of wooden barrels. This product is composed of both lump and fine lime. How carefully the lime is packed and measured, bringing to mind olden days when it was hand-weighed and packed into hand-made casks, is reflected in the containers used at present. The lime barrels are constructed of tongued-and-grooved staves which are assembled and held in place by flat steel hoops, both supplied by the International Cooperage Co. Each barrel is hand-weighed on a Fairbanks drop-platform scale.

Dexter Fine Lime is prepared by selecting the best "draws" at the hearth. This material is ground in a Type C Sturtevant hammer-mill. A Sturtevant bucket-elevator raises the pulverized lime to a steel storage-bin. From the bins the material is taken and ground still finer in a Sturtevant emery mill. A second bucket-elevator transports it to a Sturtevant 6-in. centrifugal separator. Lime which fails to pass a 60-mesh screen is considered as "tailings" and is marketed, after complete hydration, as agricultural lime. The "throughs" are carried to a two-tube Bates packer, being bagged and sold as quick lime.

Still another product, Dexter First Quality Coarse-Ground Lime, is treated in a similar manner, except that the material does not receive the finest reduction in the emery mill nor is it air-separated. Proceeding directly from the hammer-mill, where the grates are set with ⅛-in. openings, the coarse lime goes to the Bates packer where it is bagged in 4-ply paper valve-bags for shipment.

In the production of hydrate the raw lime is released from the first storage-bin through a Blaw-Knox chain-operated gate to a chute which directs the material to a weighing hopper. The batches are discharged directly to a ¾-ton Clyde hydrator. After hydration the lime is taken to the air-separator. Fine material is removed and goes to the packer, the coarse material being shunted to the emery mill for further grinding, this portion of the processing being done in closed-circuit.

A special grade of fine-grained white stone is burned in the production of Dexter Finishing Hydrate, the material being processed in the same manner as the masons' hydrate described in the preceding paragraph. The separator is set to give a much finer product for finishing purposes, however.

Typical of the thoroughness with which all raw materials are converted into marketable products is the handling of the wood ashes, a by-product of the burning. The ashes are drawn and stored under weatherproof covering and are later screened and sold in burlap bags as Dexter Wood Ashes for agricultural and gardening use.

The design, construction and installation of the pulverizing and air-separating equipment used at the plant were done by the Sturtevant Mill Co. of Boston, Mass., the work having been completed in

(*Continued on page 36*)

Electric-Motor Drive for Aërial Tramways

By R. F. EMERSON
Industrial Engineering Dept., General Electric Co.

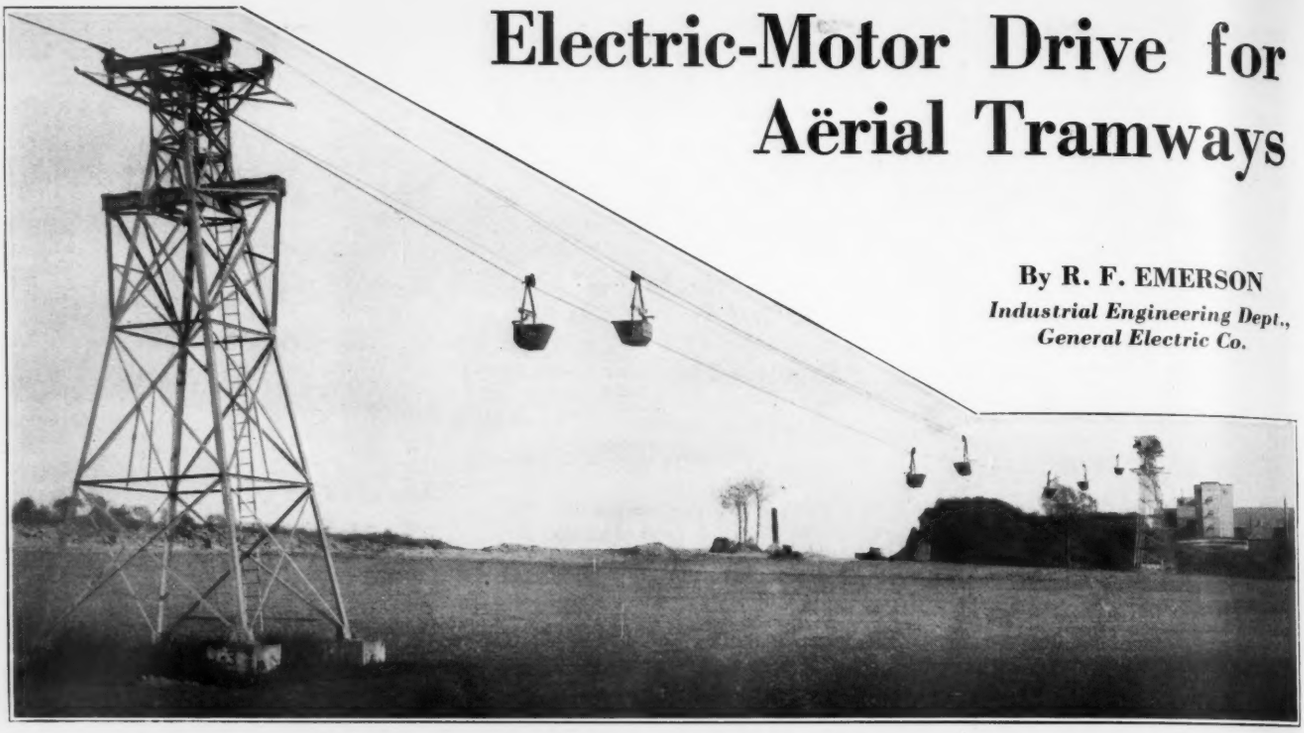


Fig. 1. Bicable-system tramway 10,125 ft. long used to carry limestone to a cement plant. A 50-hp. wound-rotor induction motor with adjustable speed control is used.

THE aërial tramway has found a place for itself in numerous operations where material must be carried a considerable distance, particularly where the contour of the ground would forbid the construction of roads or the laying of tracks. Undoubtedly the first aërial tramways were installed where the ground was so rugged that any other type of transportation was out of the question. Since then it has been found that this method has many advantages to recommend its use, even in locations which would allow the use of other methods of handling material. These advantages include low cost of operation and greater freedom from right-of-way difficulties, since the towers supporting the cables can be spaced so that the cables will bridge over roads, railways or buildings. Fig. 1 shows a Bleichert bicable-system tramway which carries 150 tons of crushed limestone per hr. from a quarry to a cement plant, and which does not interfere with agricultural operations where the tramway passes over farming country.

Types of Tramways.—There are two distinct type of tramways: (1) the continuous-carrier system, and (2) the reversible system. The latter may use one bucket which is hauled out, dumped and then returned to the loading station, or it may have two buckets, one of which returns empty when a full bucket is hauled out. The continuous-carrier type is usually employed in quarry service where the distances are fairly great and a considerable tonnage is required to be transported from the quarry to the mill.

Aërial tramways are in successful operation carrying material ranging in quantity from a few tons to several hundred tons per hour, and they range in length from several hundred feet to several miles. Continuous-running tramways are not limited in length by the strength of the tramway rope, as it is only necessary to operate the tramway in two or more sections, each section having its own drive. The tramway can be designed so that the track cables are continuous and allow the carriers to go from one section to the other without interruption. In Colombia, South America, a single-rope tramway of European design is in successful operation over a distance of 76 km., starting at 1,000 ft. above sea level and carrying both freight and passengers to an altitude of 13,200 ft. at its highest point.

Alternating-Current Motors.—Since alternating current is practically universally available, alternating-current motors are commonly used for operating tramways. The type of alternating-current motor usually used is the wound-rotor induction motor. Such a motor, used with suitable control, enables the tramway to meet the following operating requirements:

1. Ability to start smoothly without slipping the traction rope.

2. Ability to start the tramway from rest even when a high static friction has developed.

3. Ability to run at practically the same speed (without slowing down or speeding up) under varying conditions of motor load and overhauling load.

In selecting the equipment to meet the first condition a resistor should be selected, for the motor secondary which restricts the motor torque to about 50 per cent. of its full-load rating on the first point of the master switch or controller. If this is insufficient to start the load moving, it will take backlash out of the gear train and tighten up on the traction cable. Then, as the controller is advanced

to its full "on" position, the load will accelerate smoothly.

To meet the second condition it is important that the maximum running torque or breakdown torque of the motor be determined to make sure that it can start the load under the most adverse conditions. This type of motor will develop a starting torque equal to two or more times its full load torque, which will be sufficient to get the load started if the motor has been correctly applied to the drive.

As for the third condition it might be stated that the induction motor has two characteristics which are very useful where the load is transported down grade. The first is its ability to act as a brake on

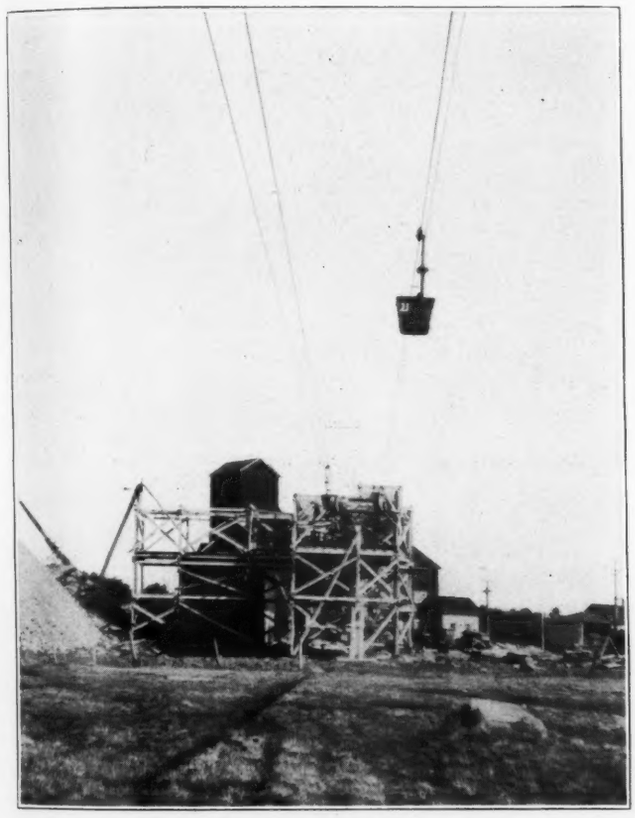


Fig. 2. A 15-hp. wound-rotor motor drives this bicable tram which is 11,670 ft. long. It carries 20 tons of feldspar hourly to the crushing plant in the background.

the load and thus prevent overspeeding when the material is being transported down a grade sufficiently steep to overhaul the motor. When being overhauled by full-load torque its speed will increase only approximately 3 to 5 per cent. above the no-load speed of the motor.

The second desirable characteristic of the induction motor is its ability to regenerate power back into the electric-power system. The amount of power regenerated depends on the amount of the overhauling load. In such cases the tramway acts as a motor power-station, capable of furnishing power to other motors in the plant, as well as serving as a medium of transporting material. It should be especially noted that there must be some other motors somewhere on the electric-power system to absorb this regenerated power as otherwise no braking effect will be obtained. In some installations the operation is such that the motor is sometimes pulling the load and sometimes braking it, depending on whether full or empty buckets are being transported. Under these conditions the motor automatically takes power from the electric-supply system for driving the load or it runs as a generator and returns power to the electric-supply system and holds back the load with very little increase in speed, all without any attention on the part of the operator. The motor should be equipped with a spring- or weight-set electric brake which will set in the event of the electric power failing and thus prevent overspeeding in case there is an overhauling load at the time of the power failure.

When a quarry is at a sufficient elevation above the mill, the descending buckets filled with stone may in themselves furnish all the motive power required. In such a case the effect of gravity is more than enough to overcome friction at all times and no external source of power will be required to operate the tramway unless the tramway should coast to rest with empty buckets, in which instance external power would be required to start the tramway moving again. The induction motor driving the tramway would then be called upon only to start the system running and, as the buckets filled up with stone, the motoring load of the motor would gradually change to a regenerative load.

Direct-Current Motors.—Direct-current shunt motors may also be used for tramway operation working under overhauling load conditions, but additional protection is necessary to prevent overspeeding when power fails on the electric-supply lines to the motor. Under this condition the motor,

Fig. 3. Along the line of the tramway shown in Fig. 2.

being driven as a shunt generator, continues to energize its own shunt field and the shunt-brake coil holding the brake released. The electric control must be so arranged that this shunt-brake circuit must be interrupted in case of power failure. This may be accomplished by the use of a centrifugal overspeed device or an overvoltage relay with its coil connected across the motor armature. An induction motor is not subject to this condition for, if its supply lines are interrupted, it fails to generate any voltage and the brake sets immediately.

In cases where the load always overhauls the motor and there is no electric-power system conveniently near it is possible to use a direct-current motor geared to the tramway to act merely as a brake. A few years ago such an installation was

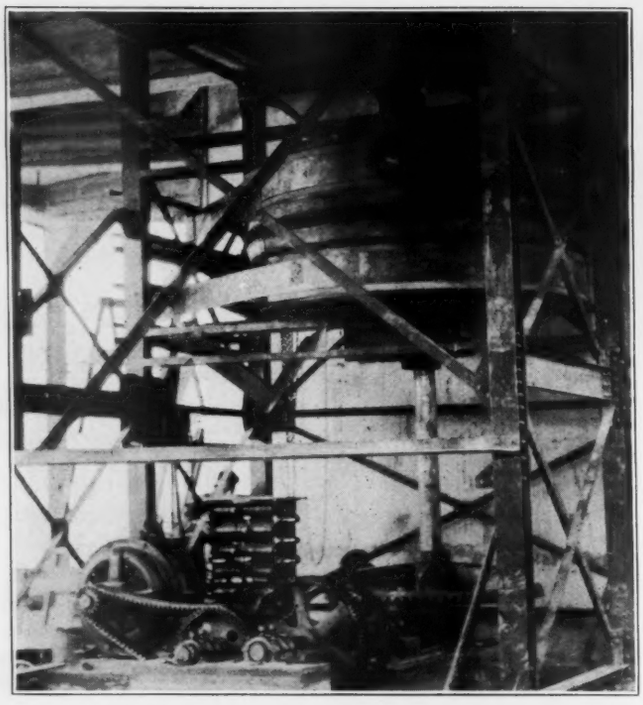


Fig. 4. This 30-hp. wound-rotor induction motor has adjustable speed control and drives a 6,670-ft. bicable tramway which hauls 260 tons of stone an hour to a cement plant when operating at full capacity.

put in service in the Middle West. After being started by a small engine, the speed of the tramway had originally been kept under control by a friction brake operated by a man whose sole duty was to vary the braking according to the load and to keep the speed reasonably constant. As no electric power was available, the engine had to be retained for starting the tramway in case it was allowed to coast to rest with empty buckets. Later a series direct-current motor was geared to the tramway with its rotation in proper direction to build up from its residual magnetism and its terminals were connected across a resistance. Its voltage built up and forced current through the external resistance, thus furnishing the necessary braking. The energy was dissipated in the form of heat in the resistance. Fairly good regulation was obtained by dividing the resistance into 3 sections and short-circuiting 2 of the sections by contactors controlled

Fig. 5. A view along the line of the tramway, the driving station of which is pictured in Fig. 4.

by specially-designed series relays. When first started, the resistance was all in circuit, giving the lowest degree of braking. When speed and, therefore, current reached a certain value, one series contactor closed and cut out a section of resistance, decreasing the resistance and increasing the current and, therefore, increasing the braking, which in turn reduced the speed. If a further increase in overhauling load occurred, causing the speed to rise again, the second contactor closed, again reducing the speed. If a decrease in load caused the speed and therefore the current to decrease to a lower value, the contactors dropped out in reversed sequence, allowing an increase in speed. By this scheme the speed, while not held to a fixed value, was held within a satisfactory range and gave good operation for several years.

Reversible Tramways.—Reversible tramways require control equipment designed for greater frequency of starting than is the case with continuous tramways and accuracy in stopping the bucket within certain limits is often required. This is necessary in order to stop the bucket under a feeder conveyor or spout to receive its load of material.

In the case of induction-motor drive a slowdown can be obtained by inserting the proper amount of resistance in the motor secondary provided that the motor is working under a motoring load during the deceleration period. In the case of automatic tramways this can be accomplished by the action of a limit switch interrupting the coil

(Continued on page 34)

Seek Devices to Eliminate Dust Hazard During Drilling Operations

Interesting Ideas Submitted in Contest Sponsored by German Industrial Bodies

AN interesting article in a recent issue of *Der Bohrhammer*, reviews the competition organized by the Prussian Ministry of Commerce and Industry, acting jointly with the German Mines Department, for a device or apparatus capable of rendering harmless the dust set up in drilling operations. The number of entries totalled 367, embodying 405 suggestions, 280 of which consisted only of drawings and descriptions, while 125 were submitted in the form of models or apparatus ready for use. The judges found, however, that none of the entries fully met the requirements of the competition, so that it was impossible to award the prize of $5,000 offered, only consolation prizes of a smaller total amount being awarded. This result, says the author, is not surprising. Although many people had tried to find a solution to the problem, the entries showed that there were no uniform and valid data upon which to judge questions of rock-dust effects and, more particularly, the effects of the deleterious dust. The questions that must be answered are these:

(1) What dust is dangerous and must be put down?

(a) Judged from its structure and chemical composition;

(b) Judged from its grain size.

(2) What quantity of the dangerous, fine dust is normally contained in the air, and what amount of dust is raised in the various operations in the rock?

(3) What air is it permissible to breathe, having regard to the quantity of fine dust contained in it?

(4) How much coarse dust is set up in all the various operations, and to what extent does it combine with or settle the fine dust?

(5) Does the mixing of quartz dust with shale dust make the former so innocuous that it can no longer harm the human body? (*Cf.* the experiments of Haldane.)

(6) What are the best and simplest means and apparatus for making dust measurements?

(7) To what extent does the penetration of dust particles into the lungs depend on the strenuous nature of the work performed by the worker?

As the commission had no useful figures to show the necessary quality of the air breathed in regard to the number of deleterious particles contained in it, the devices submitted were judged with regard to the quantity (more or less) of dust particles which they eliminated from the air, or, in the case of dust-masks, which they withheld from the air breathed. For this purpose the Owen dust-counter was used.

A much more difficult task confronted the commission when it came to testing the dust-masks. If they are judged in terms of the man actually working, they cause too many uncertainties in the results, as there are too many variations in working conditions and in the air breathed. Fortunately, there was an apparatus for testing masks at the main rescue station at Essen, and this served the purpose admirably.

The entries for the prize competition, which was merely concerned with the elimination of drill dust, may be split up into the following groups: (1) Apparatus, etc., for preventing dry dust forming in the bore-hole; (2) apparatus, etc., for preventing the dust issuing from the bore-hole from whirling up; (3) apparatus, etc., for carrying away the dust whirled up at the working place, and special solutions of the problem; (4) apparatus, etc., for preventing dust reaching the respiratory passages of the man drilling (dust-masks).

Group 1.—The object here is to transmit water through the hollow drill, or through a separate pipe, into the bore-hole, and so lay the dust. If the dust is rendered inactive by water, the drill is cooled at the same time, and good drilling performances are achieved. The drawback of this arrangement, however, is that clean water must be fed through the drill or stoppages will occur; and, further, the hammer-drill is of very sensitive design and hollow drills must always be used in place of the standard solid drills, while the presence of wetness at the working place reduces the certainty of working. In addition to these factors, wet drilling is impossible in heading operations and is difficult to carry out when shot-firing in the roof in level roadways.

Group 2.—This constituted 80 per cent. of all the entries. Whereas the method of sprinkling the fine dust with water was ineffectual, and the method of trapping the dust without drawing it away by suction and the method of deflecting the exhaust air of the drill did not eliminate the dust, the experiments or tests with the foam method and drawing off the dust by suction with nozzles or fans, have yielded such satisfactory results that these ideas must absolutely be followed up. Particularly novel is the method of settling the dust at the mouth of the bore-hole by foam produced at the working place. This process has proved really effectual as regards rendering the fine dust particles innocuous. Its drawback, however, is that it is scarcely feasible in inclined roadways, and is difficult to apply in dip roads or during shot-firing operations on levels, because of the large amount of foam generated.

The method of drawing off the dust by vacuum at the mouth of the bore-hole was already known.

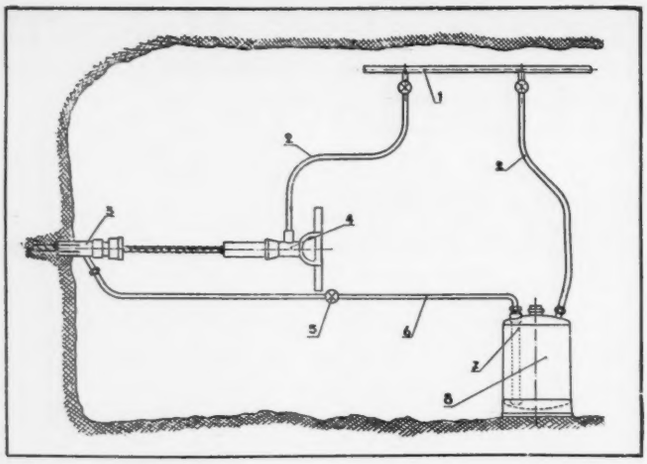


Fig. 1. Bergmannheil apparatus. 1 and 2, compressed-air pipe; 3, foam cap; 4, hammer drill; 5, valve; 6, foam pipe; 7, foam generator; 8, solution tank.

An important point, however, is that the coarse dust, constituting 90 to 95 per cent. of the total weight, is separated from the fine, noxious dust and carried away separately. The latter must then be trapped in separate dust-traps and there rendered harmless. As it does not appear practical to attach the suction apparatus to the hammer-drill, because of the extra weight involved, a pre-drilled bore-hole is necessary, unless a separate column is available, as, say, in driving inclines. But dust is, of course, set up when drilling this hole, and it has been impossible to lay this dust. It is hoped by adopting a special design to overcome this difficulty. The method whereby the dry dust is drawn from the bore-hole with the aid of the axial bore in the hollow drill, has not proved satisfactory, as stoppages occur, and the design of the hammer-drill head is too complicated and expensive a business.

Group 3.—This group comprises special solutions, which are all so clumsy, so difficult to handle, and so ineffectual, that they can not be considered. One suggestion, for instance, was to separate the entire working face from the driller by a wall of fabric, the drills being introduced through special openings. Curtains of water, or the entire dust elimination of rock-drilling operations by means of large vacuum-cleaners, were other solutions presented.

Group 4.—The disadvantage of the dust-masks is that they do not eliminate the dust, but only protect their wearers. Only partial protection is afforded, since, as the tests showed, either the fine noxious dust passes through, or the resistance of the mask is so great after a time that the worker gets short of breath. Another vital point to note is that all designs in which fresh or compressed air, or thin curtains of water are used, are too cumbersome, and that brush-type filters are impossible because they are ineffectual and filter cartridges because they are too heavy.

The most interesting and novel attempt at a solution was the Bergmannheil (Miners' Welfare) (Fig. 1) of the Minimax Co., Berlin, for which a prize of $625 was awarded. The device comprises the three following main parts: (1) solution tank with foam producer, (2) foam cap, and (3) piping. The solution container is a can made of sheet iron lead-coated on both sides, holding about 5½ gal., and having three openings in the cover. The middle opening is for filling it, while the openings on either side are for connecting the compressed-air pipe and the foam producer. The latter (see Fig. 2) has a main pipe *h*, closed off by strainers *i* at the screwed ends *k* and *l*. The main pipe *h* has a branch *m* on the top, into which is inserted a disk having a ½-mm.-diameter hole. From *m* a pipe *n* is carried to the lower strainer. The screwed portion *k* has a disk with a 1-mm.-diameter opening and, like the branch *m*, is protected from dirt by gauze. The top screwed connection *l* is screwed into the lid of the tank. The main pipe *h* is filled with a granular mass. The foam cap (Fig. 3) consists of an outer and an inner tube *q* and *u*. The front portion of *q* has a rubber washer *r*, and is slotted to give it a certain amount of spring. The back end has a screwed ring *s* and a tube *t* for connecting to the foam pipe. The front part of the inner tube has, in front, a taper ring *v*, with a tube *w*, and is constructed so as to be flexible. A threaded ring *x* can be screwed into the outside tube ring *s*. A bush *y* on the rear end of the outside ring has the brush-ring *z* secured to it by means of a special nut. The taper ring *v* of the inner tube *u* has six holes of 6-mm. (¼-in.) diameter. The leads consist of hemp-lined rubber tubing.

Reference to Figs. 1 to 3 will show how the foam

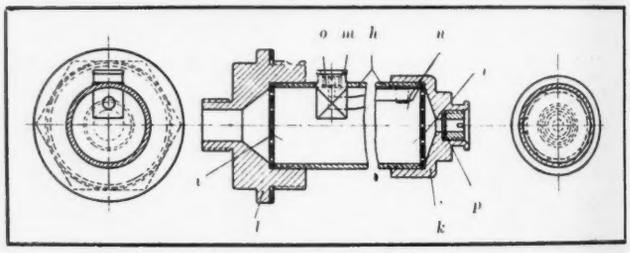


Fig. 2. The Bergmannheil foam generator.

process operates. The solution tank is filled with 5½ gal. of water and 150 g. of saponin, which must already be dissolved, if possible, so that a 0.6-per cent. solution is obtained. The compressed air forces the contents of the tank upwards through *p* (Fig. 2). At the same time the compressed air forces its way downwards through *o* and, through the pipe, a foam is set up by friction in the granular mass, and passes through the rubber tubing to the foam cap. At this point the foam passes between the inner tube *u* (Fig. 3) and the tube *w*, forces the latter against the outer tube *q* and, passing through the six holes in the taper ring *v*, reaches the inner

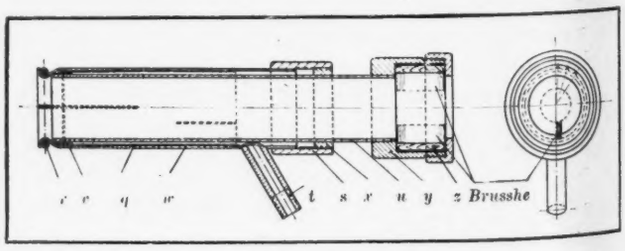


Fig. 3. The Bergmannheil foam cap.

tube, *u*, where it combines with the dust issuing from the bore-hole. The mixture drops out at the rear end of the foam cap. The advantage of the foam method is that the foam satisfactorily settles or combines with both the coarse and the fine dust,

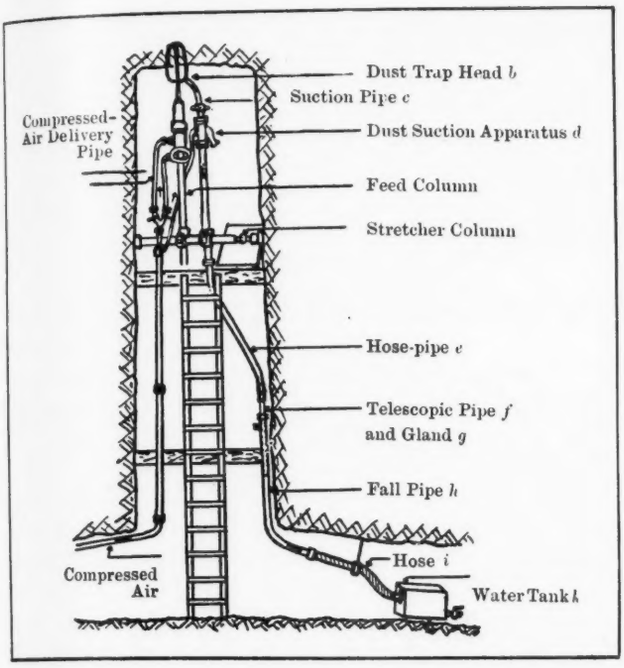


Fig. 4. Dust-suction apparatus with dust-settling device.

and the foam retains the dust for a long time even after it is dry. Moreover, since the preliminary bore-hole necessary for the foam cap can be drilled dust-free with the air of foam, this particular solution of the problem seems to have a future. It must be borne in mind, of course, that the foam issuing at the mouth of the bore-hole retains the drillings somewhat. This causes the performance to drop off when drilling deeper holes, or the drill may even stick fast, especially when drilling downward holes. The foam set up also causes difficulties when inclines or dip roads are being sunk by inconveniencing the men and wetting them through. Further extensive tests must therefore be carried out with a view to eliminating these defects and ascertaining the cost of the process.

The Reform apparatus, submitted by R. Schreiber, Neunkirchen, Krs. Seigen, was also awarded $625. This apparatus (Fig. 4) consists of the dust-trap plate *b*, with suction pipe *c*, and the nozzle arrangement *d*. From this point the 12-ft. hose *c*, the telescopic pipe *f*, with stuffing-box *g*, the pipe *h*, and the hose *i*, lead to the water-container *k*, in which the fine dust is precipitated. The trap plate has a lateral opening through which the drill is passed. It pivots about the suction pipe by means of a screwed joint. Fig. 5 shows the dust-suction apparatus proper. Its main feature is that it contains a suction nozzle *i*, and separates the coarse and fine dust at the same time by a slanting sieve *t*. The compressed air enters the nozzle *u* through the connecting branch *m*, and sets up a suction effect in the nozzle *o*, which is transmitted through the space *p* to the suction pipe and the trap plate. To allow of the working conditions, *e.g.*, the height of the staple and the nature of the rock, a nozzle of suitable diameter can be inserted so as to produce the suction desired. An important point is the arrangement which carries off the coarse dust separately. This is done by the pipe *r*, with cover *s* and sieve *t*. No larger grains can pass through the latter than the neck of the air-nozzle will allow. The coarser pieces slide down on the slanting surface of the sieve and drop into the pipe, through which they are blown out by opening the cover *s*. Speaking generally, even though this apparatus exhibits defects as regards the complete elimination of the fine dust, there is no reason why the design could not be improved so as to enable it to be successfully used underground.

Various other types of apparatus were submitted by competitors, all of which, however, failed for one reason or another to afford a practical solution to the problem.

In concluding their report, the judges refer to a number of points on which further investigation is desirable, and recommend certain alterations suitable for incorporation in the apparatus tested.

With regard to determining the dust content of the air from the bore-hole, the Owens apparatus, though suitable for current checking and comparative purposes, should have a mechanical pump to insure uniform air velocity and be arranged to vary the quantity of the sample according to the amount of dust present. Experiments are desirable to ascertain the effect of grain size, composition and structure of the dust, and the temperature, humidity and flow of the air on the time the dust remains in suspension. The influence on the drilling speed

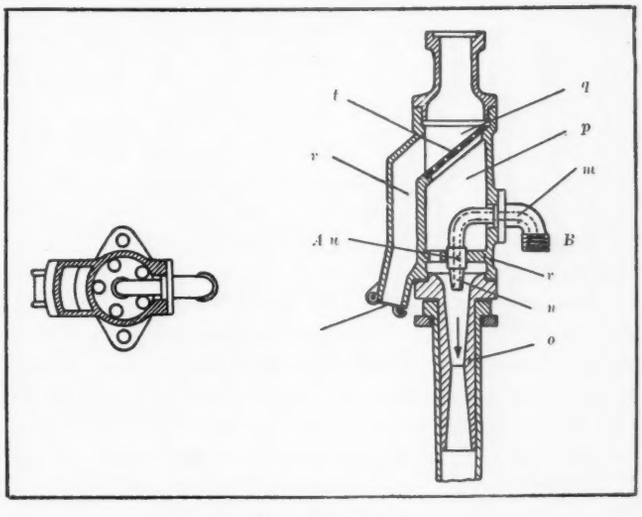


Fig. 5. The Reform apparatus.

and the shape of the bits on the amount and size of the resulting dust, as also the wetting effect of various liquids on the finest dust particles, need further elucidation, as does likewise the physical and chemical action of various stone dusts on the human organism. In the prize foam apparatus, the generation of foam should be under better control, and the foam consumption reduced; the preliminary bore-hole must be abolished or given greater pro-

tection against the emission of dust, and the foam cap simplified and more securely fixed in the hole. The suction method is the only effectual dry method, but the dust must be exhausted at the mouth of the hole and not through a hollow drill. The coarse dust should be separated from the fine as quickly as possible, so as to protect the fine screen and reduce the consumption of compressed air, and the vacuum is more economically generated with fresh air and not by the drill exhaust. The fine dust should be collected in bag filters, inclosed in a perforated case and removed to a safe place for emptying, so that the dust does not get into the ventilating current. The exhaust air from pneumatic picks can be deflected by means of a cap, so as to blow the dusty air away from the driller, and air leaking from the head of the pick should be trapped to prevent it from stirring up dust. With regard to masks, those employing filters are alone suitable at present, the best filters being of woven fabric or with Raschig fillers. The filter should have a large area to lessen the resistance to breathing. Masks should not weigh more than about 7 oz., be easy to clean, with a wide field of vision, be easy fitting without exerting undue pressure, and have pneumatic rims, provisions being made for removing saliva, and with accurately constructed exhaust valves to prevent the passage of dust during inhalation.

The judges consider that the dust problem can not be solved by protective devices alone, since there will always be some dust in the air through defective construction or handling of the apparatus. They therefore recommend the provision of ample separate ventilation, in dusty places, arranged so as to prevent stirring up the fine dust, and preferably so that the current passes through the working place. Finally, they advise that the drillers should not have to stand near the mouth of the bore-hole, but that the picks should be mounted and fed forward by mechanical means, such as pillars and slides. This method also relieves the operatives from the muscular and nervous strain produced by the weight and recoil of the picks, and though it may need the services of a second man, he can attend to more than one drill.

The measures necessary for preventing the dangers of silicosis will always entail considerable expense, combined with intelligent training of the operatives, organization and supervision of the work, but this is essential in view of the fact that about 95 per cent. of the industrial diseases in mining are due to silicosis, 20 per cent. of these cases being fatal, and that very large sums must be paid in compensation and treatment. Systematic measures and collaboration of all those concerned are consequently indispensable in the interests of the health of mine workers and the mining industry.

Electric Drive for Tramways

(*Continued from page 30*)

circuit of one of the accelerating contactors, when the incoming bucket arrives at the proper distance from the loading terminal. It should be noted in particular that the load on the motor must be a motoring load, because inserting resistance in the motor secondary with an overhauling load will cause the motor to speed up instead of slowing down. After slowing down to a creeping speed a track-type limit switch can be used to cut off the power to the motor and get a fairly accurate stop.

In order to furnish an estimate of the proper motor and control equipment for either type of tramway it is necessary to furnish the electrical manufacturer with a power graph, showing the power plotted against the time for a complete cycle of operation, besides all information in regard to any special details of operating.

Austrian Magnesite Output Slumps

(*Continued from page 22*)

in previous years, increased markedly in 1931 to 1,351 tons, an advance of 235 per cent. over the 1930 shipments. These exports went chiefly to German border districts.

Exports of dead-burned magnesite came to 27,491 tons in 1931, compared with 58,039 in 1930, a drop of 53 per cent. This decline is attributed to a reduced demand on the part of the iron and steel industries in most countries. The United States took 60 per cent. of the exports in this class during the fourth quarter of 1931. Shipments to America were considerably below the 1930 level throughout the year, but in the fourth quarter were much larger than in any preceding quarter in 1931.

Exports of caustic calcined magnesite did not decline quite so much as those of dead-burned magnesite, but the decrease amounted to almost one-third. The total for 1931 was 18,404 tons compared with 26,882 tons in 1930. There was no material change in the direction of these shipments. The leading markets were Germany, which took 45 per cent.; France, 26 per cent.; and Czechoslovakia, 18 per cent. No exports to the United States were recorded in 1931.

Export prices differed slightly according to market conditions, but, upon the whole, prices showed a gradual downward trend throughout 1931. There are price agreements between the magnesite plants producing caustic calcined magnesite so far as sales to Germany are concerned. A pronounced decline of general activity during the year seriously affected the Austrian magnesite industry, and the overhead expense per unit of output increased in proportion to the decline of production.

Notwithstanding the continuous shrinkage of business during the past two years, the leading Austrian magnesite companies maintained their dividends on a level of from 12 to 18 per cent. of par value. They were in a position to follow this policy because they had reserved some of the large net profits made in prosperous years and because of a very large export business. The unfavorable conditions in the industry also find expression in a decline of the market values of stocks of the magnesite companies.

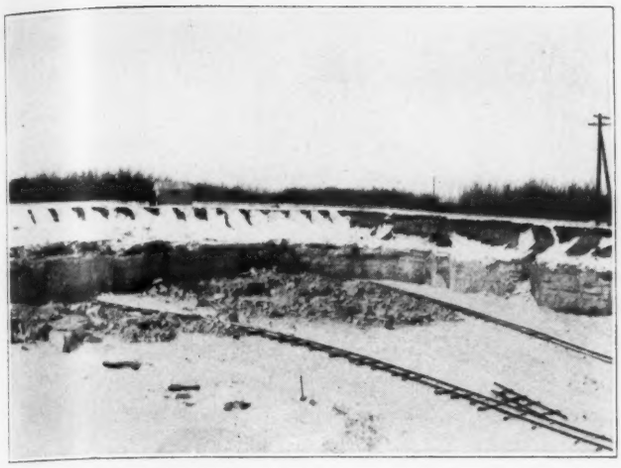


Fig. 1. Blasted-down stone ready to be hauled to the plant.

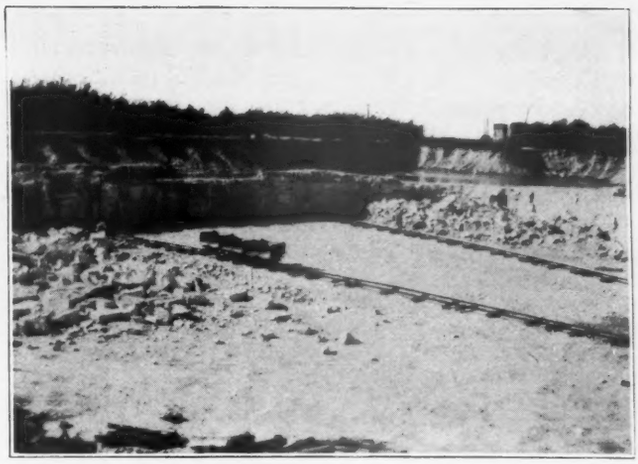


Fig. 2. Note how the quarry tracks are kept close to the stone.

Lime Plant North of Winnipeg Operates Through Winter Despite Cold

By F. J. PEARSON
Gen. Supt., Winnipeg Fuel & Supply Co.

ONE of the most northerly commercial lime plants on the American continent is operated by the Winnipeg Supply & Fuel Co. at Stonewall, Manitoba, 20 mi. north of the City of Winnipeg. While the winters are not always long or severely cold, there is always the necessity of considering the factors of frost and snow from October to April. Also, in winter the demand for lime falls off considerably, and it is not advisable to shoot large quantities of stone at one time, as part of a shot might be buried in snow, or, after a thaw, might be embedded in ice. The method of adapting the work to these conditions is the subject of this article.

Winter operations are generally confined to the No. 2 plant, which consists of two vertical kilns which are built of stone, are continuously fired with wood, and have an output of 18 tons of lime each per day of 24 hr. They are filled by a derrick. A light track runs from the kilns to the quarry face. Nine skips, transported on low quarry cars, are used, a horse pulling 3 cars per trip. There is a passing track at the kiln end, and a switch near the quarry face dividing the track into two.

Stripping overburden is done in sections, and not all along the face. In starting to work a section an 8- to 10-hole shot is put off in the center, and loading tracks are placed on each side of the shot. Three men work on each track, breaking the stone and loading the cars when placed. Empty cars are placed on one track, and full ones are pulled out on the other.

The tracks are operated on the principle of the blades of a scissors, being brought closer together as the shot is worked out. Then a shot is fired on the outer side of the tracks, and the tracks work outward. Figs. 1 and 2 show the operation. In Fig. 1 the stone is between the tracks and ready to be handled, with a small portion of an outside shot on the left of the picture still to be cleared up. Fig. 2 shows the tracks working outward. The tracks are always close to the work, and while it is sometimes necessary to remove three or four sections of the ends of the tracks for a blast, shifting is reduced to the minimum.

At the kiln end of the track is a bin, divided into three sections with a sloping stationary screen on the top (Fig. 3). Holes in the upper section of the screen are 1¼ in. round, and in the lower part 3½ in. round. The stone going through the upper screen is discharged into the bin at the right, that through the lower screen into the center bin, and the oversize stone into the left-hand bin. This bin is a necessary part of the scheme, as all stone is cleaned up by the loaders, as may be seen in Fig. 2. Skips are loaded with either kiln-size stone or chips. Kiln stone is dumped directly into the kilns. Skips containing chips are lowered on a small platform made of two light rails which connect with angle irons reinforcing the bottoms of the skips. The platform slopes to the front so that the contents of a skip are discharged over the screens. Fig. 4 shows a skip in the act of discharging. Most of the screen is covered, as it was found that a high wind from the front would stop the flow of the stone. The bin at the right takes snow or slush out of the stone, leaving in the center bin a clean stone which goes to the crushing plant. In the summer small stone is also crushed, or sold direct, for surfacing country roads. The oversize stone is drawn out into skips periodically from the chute shown at the left bottom of Fig. 3, and is used in the kilns.

The kilns have a good natural draft, and the amount of this stone used is governed by the condition of the kilns. This system is used all the

year around and seems to work very satisfactorily, 80 per cent. of the stone shot being kiln size, and of the remaining 20 per cent. to 35 per cent. is salvaged by the screening process. It is also flexible, and allows putting in extra loaders when necessary, or taking away men when the kilns are not being filled.

The stone is a dolomite, and produces a high-grade white lime. The rock strata are horizontal,

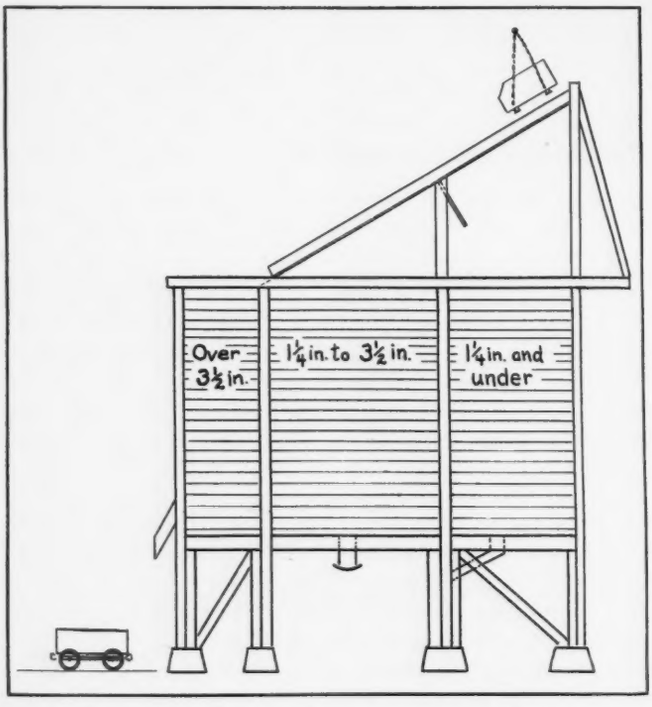


Fig. 3. Drawing of the bins where the sloping stationary screen overhead separates the stone into three sizes.

the beds being from a few inches to 3 ft. thick. In one place quarrying is done within 100 ft. of residential property in the town, necessitating careful blasting. But in spite of this, a ratio of 5 tons of stone to 1 lb. of dynamite is secured, including secondary blasting. The total labor cost, including track shifting, but not drilling and blasting, is around 75 c. per ton of lime produced.

Driling is done by Chicago Pneumatic and Ingersoll-Rand air-drills, which are supplied with air from a 220-cu. ft. Chicago Pneumatic portable electrically-driven air-compressor. In winter the compressor is housed in a shed built in sections (Fig. 5). It is not necessary to move the compressor often, but this can be done and the shed taken down and reassembled, ready to work, in 2 hr. time. There is an air-tank on the compressor, but during cold weather a second tank is connected outside the shed. This acts as a condenser for the moisture in the air and prevents the drills from freezing.

Fig. 4. Skip discharging to the stationary screen over the bins.

Fig. 5. The compressor is housed in this building in winter.

Carries on Lime-Making Traditions

(*Continued from page 27*)

1929. Screw-conveyors, bins, chutes, and the weigh hopper used in measuring the raw lime for hydrating, were furnished by the Blaw-Knox Co., which was also responsible for the layout of the operation as now designed as well as for the co-ordination of the newer equipment with the old.

No story of the Burton K. Harris operations can be complete, however, without the story of Burton K. Harris himself. Born at Lime Rock in 1891 and reared in the traditions of the lime industry, he attended the grammar schools of the village, prepared for his higher education in the preparatory school of the Rhode Island College of Agricultural and Mechanic Arts at Kingston, and was graduated from Rhode Island State College in 1911 with the degree of B.Sc. in chemical engineering.

While attending college Mr. Harris became a cadet captain in his college battalion and after leaving school enlisted in the Rhode Island National Guard, being commissioned a second lieutenant in 1917. Shortly thereafter he taught military science and tactics at Central Falls high school. With war clouds gathering Lieut. Harris sailed for France March 28, 1917, being one of the first Americans to arrive for overseas service. He participated in some of the fiercest fighting in the Allied lines, including the battles of Aisne-Marne, Oise-Marne and the Meuse-Argonne. Honorably discharged at the close of the war, he returned to his native Lime Rock to devote full attention to his properties.

In addition to his business life since returning from France, Mr. Harris has found time to take a prideful interest in civic and political affairs. He has served as president of his county farm bureau, the Pawtucket Kiwanis Club and as commander of his American Legion post—to mention but a few of his interests—and during 1923 and 1924 he served in the State Senate of Rhode Island.

The Trade Association and the Problem of Economic Stabilization*

By DR. RALPH J. WATKINS
Director, Bureau of Business Research
University of Pittsburgh

THE proposal of Gerard Swope has brought to the fore in current discussion the place of the trade association in the problem of economic stabilization. The address delivered by him before the National Electrical Manufacturers' Assn. last autumn was concerned primarily with a program of insurance protection for employees, including unemployment insurance, but, singularly enough, most of the discussion aroused by that paper has related to the idea of the trade association as an instrumentality of economic control. On this point little is to be found in Mr. Swope's address beyond the general idea that stabilization should be furthered by means of trade associations operating under some form of government supervision. Nothing is said in that paper on the problems of freedom of entry into business, coercion of recalcitrant firms, allocation of markets, determination of production quotas, and price fixing. In consequence, I shall not attempt to discuss the Swope Plan but shall confine my remarks to a presentation of my conception of the problem of economic stabilization and the relation of economic research to that problem.

Implicit in Mr. Swope's address is the assumption that American business men would know what to do to achieve economic stabilization if given the power to act in concert through their trade associations. To my mind this assumption is of doubtful validity and my own approach to the problem is, consequently, an experimental one through the medium of economic research. Briefly, my position is that recurring break-downs in our economic structure are the result of inadequate economic organization and that we should attempt to improve the economic organization of our industries by creating machinery through which industrial executives and trained economists could collaborate in continuous study and application in the solution of the problems of economic stabilization.

The Failure of Our Economic Organization

Conviction is growing among business men and economists alike that the battle for "rugged individualism" has been lost because that philosophy is a destructive one in the machine age and no longer serves the interests of producer or consumer. Under our present economic organization we witness recurring periods of inflation and deflation, of expansion and contraction, of feverish optimism and equally feverish pessimism. Proceeding from one economic debacle to another, we strain ourselves to correct the dislocations of depression only to face the equally distorting maladjustments of prosperity. We naïvely call this complex of a host of uncontrolled factors our economic system and with childlike faith we rely on the principles of scarce understood or yet undiscovered economic law and the beneficent operation of an unseen hand in guiding our economic destinies. That this "system" has its roots in fallible human experience and is therefore subject to an evolving process of improvement and control seems never to occur to us.

We have in this country the most magnificent plant equipment that the world has ever devised, set up in the largest free-trade area the world has ever known—a market of 125,000,000 consumers educated to the highest material standard of living that the world has ever seen; and yet millions of workers, able and willing to work, are looking for work in vain; millions of people are underfed, millions are underclothed, and millions are underhoused. Profits are vanishing; our industrial plants are idle or operating at a small percentage of their capacity; industrial workers are without the opportunity of utilizing their skill; and our standard of living is being driven down when about us we observe all the material factors necessary to a rapidly advancing scale of life. With more acute vision we shall observe that it profits not an industrial society to be surrounded by an abundance of natural wealth, a gorge of foods, a plethora of raw materials, an unrivaled plant equipment, a ransom of gold, and an army of skilled craftsmen if the economic organization which intervenes between producers and consumers is inadequate to the task.

The colossal failure of the twentieth century is in economic organization. Our scientists and engineers can build plants and produce goods beyond our imagination; they can provide the physical basis for a standard of living immeasurably superior to our present one; but they are effectively prevented from doing so by the inadequacy of our economic organization. It may be observed that this inadequacy is the inevitable result of two inherent weaknesses:

(1) Under our present form of economic organization it is not the business of anyone to think and plan in terms of the function and place of a given industry (the iron and steel industry, for example) in our economic structure.

(2) It is not the business of anyone to think and plan in terms of the function and operation of the economic structure as a whole.

We have developed a science of management of individual concerns and we have carried that science in many cases to a high pinnacle of efficiency. But we have not even made a beginning in the science of economic management in terms of industries and in terms of the structure as a whole. Our industrial

* Presented at the Pittsburgh conventions of the National Crushed Stone and National Sand & Gravel Assns.

executives are held responsible for the profitable operation of their respective enterprises but the factors of primary importance in shaping their balance-sheets and profit statements are entirely beyond their control. We demand business leadership to pull us from the morasses into which we periodically fall, forgetting that we have not yet created any positions in business leadership. The president of a billion-dollar concern is as helpless as the economist on the sidelines. This inadequacy of economic organization represents the failure of unregulated competition, the failure of the philosophy of letting things drift.

The basic merits of competitive economic organization have been described as: (1) a tendency to promote individual freedom; (2) a flexibility in the adjustment of productive processes and economic relationships; and (3) a tendency to safeguard the public interest against private exploitation. These are all precious advantages and can not lightly be cast aside; they represent, however, general long-run tendencies and are counteracted by short-run tendencies toward wasteful competition and economic instability—functions of imperfect economic organization. Miscalculations in business policy, due to inadequate knowledge of market conditions and relationships, can only lead to recurring maladjustments between supply and demand. Self-interest, to be effective in our complex economic environment, must be informed, enlightened, and guided. Self-control of industry is possible when we have the facts and understand the economic relationships involved—the function of economic research. When we replace unfettered and unregulated competition with informed and enlightened self-control, we shall have taken a long step in the direction of a stabilized economy.

Capitalism represents a form of economic organization which is worthy of survival—not the capitalism of idle industrial plants and not the capitalism of 6,000,000 unemployed, but the promise of capitalism we may justly vision from the material progress which capitalism has brought us in the past half-century. But it becomes increasingly clear that this form of economic organization will survive only on the basis of a constructive modification more in harmony with the economics of the machine age.

Granting the need for modification, there remains the problem of determining in what particulars and by what methods we shall modiy our economic system. Experience tells us that there is no ready solution of our problem, that there is no panacea for our ills; but the spirit of scientific inquiry suggests that economic research and economic engineering may point the way out. If we can not progress toward more efficient economic organization by combining the advantages of economic research and practical business administration, then we must forfeit our claim to leadership and surrender the problem to outside agencies.

Economic research has until recently been concerned largely with the discovery of economic truths of laws, represented by the production of research monographs which enrich our body of economic principles and add to the sum of human knowledge This type of research is highly important and should be stipulated and encouraged; through this accumulation of knowledge we may eventually build a science of economics. The question may be raised, however, whether the time has not come when we can make a beginning in broad economic engineering parallel with our construction of the science of economics. Just as the engineer could not defer his task until the atom was fully explored, so the economic engineer can not wait upon the last word of economic theory but, rather, must tackle the problem with the best tools available—and those tools are not wholly inadequate. Granting that we do not know how to control our economic system, it may still be observed that we shall never learn except on the basis of study and experimental effort. Our problem is that of coördinating and controlling our productive activity to prevent recurring periods of economic dislocation and to progress toward a higher standard of living. This will require improvements in economic organization in the direction of control. Through experience in the experiment of guiding industries we shall perfect a technique of control.

A Philosophy of Control

No intelligent and far-seeing business man can survey the present situation with satisfaction or look into the future without apprehension. Available evidence suggests that economic depressions are becoming more severe and there are strong *a priori* reasons for believing that this is and will continue to be true.

(1) Our population is rapidly becoming urbanized, which means that more and more people are being uprooted from the soil which constitutes the ultimate source of economic security; loss of employment spells complete stoppage of income and disaster to most urban workers and means to the economic order as a whole an interrupted flow of purchasing power.

(2) Our economic organization is rapidly becoming mechanized and industrialized, meaning an ever larger overhead burden and an increasing dependence on the continuity of markets.

(3) Our relatively high and rising standard of living means that an increasing proportion of consumer expenditures consists of expenditures which can be deferred; industries are built and marketing facilities are developed on the assumption of a normal volume of consumer purchases but in a period of economic insecurity the consumer may wreck these industries and trade facilities by the simple decision to defer non-essential expenditures.

The growing complexity of our economic system and the increasing extent to which our population is dependent for a livelihood on the orderly conduct of business point to the inevitability of changes in our economic organization directed at more efficient control. The logic of present events suggests, therefore, that a philosophy of control may be essential as a substitute for the outmoded philosophy of unregulated competition.

Self-Control of Industry

If economic stabilization is to be achieved under our present form of economic organization, then our business must learn to control itself, subject to that degree of public supervision which experience indicates to be essential. There is realistic promise in this situation since American business men are the technicians most competent to control; it is they who have the most intimate knowledge of the business forces which make up our economic system. Political control under our form of government and under our philosophy of individual liberty is neither practicable nor desirable. The very complexity of our economic life would destroy any plan for central control, even if consent to a program of central economic control could be secured. And it may be observed here that a people does not accomplish a complete overturn in its form of economic organization—which central economic control would require—except on the basis of a social upheaval. This costly and destructive method is foreign to American experience and not even the most optimistic revolutionary would predict such an occurrence in the measurable future. The method open to us is that of building on our experience, utilizing existing agencies in experimental effort, and evolving from this process toward an efficient economic organization for control. The problem of economic control represents a challenge to our intelligence and our managerial ability. Acceptance by industry of this challenge holds great promise of achievement and human happiness. Failure to accept the challenge invites ultimate disaster.

The cry of American business is: "Less government in business." By all means, let us have less government in business, considering the complexity which is business; but it may be questioned whether this essentially negative position is the intelligent approach. If business would have less government in business, then business must set its house in order. Government interferes when private control proves inadequate. Every activity of business is tinged with a public interest; our very existence is dependent on business conduct. Recognize the obligation of self-control by business in the interest of stability and general economic well-being, achieve that stability, and we shall remove the justification for government interference in business.

Trade-Association Approach

Assuming the desirability of self-control by industry, how may this be exercised? A trade association or industrial institute, representing those with common interests, is the logical organized body for control in each of our basic industries. Through these trade associations American industry has a rich background of practical experience in the consideration of problems common to the industry. Industrial control presents a problem of reconciling viewpoints and interests within the industry and of coördinating activity within the industry and between industries. No agency of business is better equipped to attack the problem than industry's own trade organizations.

In some quarters it will be objected that the trade association or industrial institute as now constituted is not qualified to function as an instrumentality of control. In many cases this will be apparent at once and in many cases the objection will not be valid. These organizations, however, represent the existing agency set up to cope with the common problems of the industry. If control of industry by industry is to be attempted, the trade association or institute is the appropriate body. Obviously, the initiation of a program of control would require changes in organization and method; such a program would require, for example, much more active participation by the chief executives of an industry than now generally obtains since the problem of control would affect major problems of policy in the most direct manner.

Legal Restrictions on Coöperative Control

Our attitude toward competition has undergone a complete shift of emphasis within recent years. When our present anti-trust laws were enacted, the public clamor was for protection against the exactions of monopoly. To-day we stand in dread of the consequences of unrestrained competition and our need is for protection against instability, economic insecurity, and a low standard of living. Under these circumstances it is natural that the present period should be one of confusion with respect to our anti-trust laws. On the one hand selfish interest urges complete freedom of business; on the other hand rigorous enforcement and strengthening of the law is urged.

No thoughtful student of the problem urges the repeal of our anti-trust statutes; none but the most selfish partisan would suggest that we remove prohibition of monopoly from our substantive law. Certain it is that competition and economic freedom will remain the keystone of our business structure; we shall not, as one critical observer fears, make monopoly the life of trade. Equally certain it is, however, that we shall not allow competition and economic freedom to extend to the point of anarchy. We must in some manner achieve regulated competition and economic freedom in the interest of the general welfare, in recognition of the complexities of our urban, industrial civilization.

We now recognize in our thinking the distinction between measures, the effect of which is to regulate trade and thereby to promote intelligent competition, and measures designed to stifle competition. Either type of measure is a restraint upon trade; the one, however, being an intelligent and reasonable restraint for the common good, the other representing a predatory and unreasonable restraint. We shall eventually be compelled to bring this distinction into our statute body and in doing so we shall not eliminate competition from our economic system; we shall merely posit competition on a more intelligent and economically constructive level.

The Need for Research

Industry must be stimulated from the outside to tackle the problem of control. An impartial research agency, free from political influences, representing industry generally but owing allegiance to no group, completely

free in its researches, and bending all its energies in the direction of finding practical means of achieving economic stability for the common good, is the appropriate body for outside stimulation and guidance. We can not afford to rely on sporadic efforts at control; our thinking and our energies must be directed in an organized way at the broad objective of conscious planning.

It may further be observed that an outside impartial agency is necessary to a program of economic control for the following powerful reasons:

(1) We must face the unpleasant fact that nobody knows in terms of a specific program, what we should do to control our industries and plan their progress in the direction of stability. In consequence, we must approach the problem on an experimental basis—not in terms of academic research but in terms of a joint program of study and application between business executives and economists.

(2) Isolated programs of planning in a few industries, however important the industries, will avoid the primary problem of control of the business cycle. No industry is a law unto itself; no industry can escape the consequences of recurring break-downs in the economic system as a whole. Only by a concerted program of coördinated planning can we hope to cope with the complex forces which periodically undermine our standard of living.

(3) The problem is so immense that it is of paramount importance that an agency be created so that competent specialists—a corps of economists of the first rank—may be permitted to devote their entire energies and intellectual resources to continuing study and application in the control of industry. It is not enough to strike while the iron is hot—to prepare a plan while we are in the midst of depression and while the inadequacy of our economic organization is apparent to all observers. We must build a program on a solid foundation that will not be swept away by the next wave of prosperity, when critics will be laughed to scorn by so-called practical men who are complacent with speculative profits, who are intrigued by the bubble of inflation, and who are blind to the ultimate break-down which their very actions make inevitable.

(4) The element of competitive advantage and the element of a dominant firm in a given industry render it essential that an outside agency,of unquestioned integrity and impartiality and free from any subservience to any firm or group in the industry, be the guiding force in a program of control.

(5) Only through a continuing central research agency can we hope to accumulate a record of experimental effort at control, so that the experience of many and diverse industries in attacking the common problem may be pooled. Of such stuff is a science built and from this pool of experience we may construct a workable technique of control.

An Institute for Research in Economic Control

There is in the country no economic-research agency committed solely to a continuing study of the causes of economic instability; no single agency whose task it is to propose solutions on the basis of scientific inquiry; no single agency to which organized industry could refer its problems of instability for an analysis and prescription.

It is submitted that what is needed is the establishment of an Institute for Research in Economic Control for continuing scientific investigation of the problems of economic stabilization, including the development of a scheme or technique of control of basic American industries with the active collaboration of each organized industry. The program of such a research organization should be shaped to assist in the development of enlightened, coöperative self-control of industry for the purpose of achieving economic stabilization and should involve:

(1) Continuing study of the general problems of economic control or stabilization, including the central problem of monetary and credit control.

(2) Coöperation with trade organizations for the purpose of fostering and facilitating efforts to increase economic efficiency and industrial stability under existing conditions.

A tentative form of organization for an Institute for Research in Economic Control may be outlined, merely as an indication of how it might function:

(1) *A staff of experienced technicians* in the economics of production, marketing, transportation, foreign trade, finance, accounting, and statistics, to study the general problems of economic control and to act as advisors to and directors of the research fellows named below.

(2) *Research fellows in industrial control*—the most competent business economists available in this country, to be assigned each to a major industry, to collaborate with that industry through its organized association or institute in the development of a plan for control of that industry.

(3) *A statistical laboratory* whose function it would be to appraise the adequacy of the statistical records available in each coöperating industry and to coöperate with the trade association in developing the records necessary to planning.

(4) *A legal-research division,* for the following purposes:

(a) To study the relation of our present legal restrictions on coöperative effort to the program of the institute and to make recommendations on the basis of that study.

(b) To study legal means of stimulating trade-association membership.

(c) To study means of protecting trade groups and the public generally against unfair prices.

(d) To serve as advisors on all legal matters pertaining to the institute's program.

The problem of economic control is and will continue to be our basic economic problem. It should be emphasized that this problem is not merely a problem of the current depression. The lesson of economic history is that depressions are not permanent, that we do in some manner muddle through them and into a subsequent period of prosperity. This, however, is just half the story. Neither is prosperity permanent; it likewise terminates and is succeeded by depression. In a very real sense the problem before us is the problem of the next depression. Will it, too, find us as a nation hopelessly confused in our counsel, totally unprepared in our organization, and futilely chasing our shadows?

MEN OF THE INDUSTRY

The portrait printed on this page in each number of PIT AND QUARRY is selected without significance as to current events or the position of the individual in the industry.

R. L. SLOCUM
Plant Superintendent
Universal Atlas Cement Co.
Universal, Pa.

Coming Events

May 19, 1932. Erie, Pa. Seventh Annual Northwestern Pennsylvania Safety Conference. S. M. Lippincott, secretary, Erie Safety Council.

May 24-25, 1932, Cleveland, O. Annual Convention, National Lime Assn. Norman G. Hough, president and general manager, 927 Fifteenth St. N. W., Washington, D. C.

May 25, 1932. Louisville,Ky. Fourth Annual Ohio Valley Safety Conference.

June 9, 1932. St. Louis, Mo. Monthly meeting, St. Louis Quarrymen's Assn., Forest Park Hotel. E. J. McMahon, exec. sec., 4063 Forest Park Blvd., St. Louis, Mo.

June 20-24, 1932. Atlantic City, N. J. Annual meeting of American Society for Testing Materials. C. L. Warwick, secretary-treasurer, 1315 Spruce St., Philadelphia, Pa.

October 3-7, 1932. Washington, D. C. Twenty-first Annual Safety Congress, National Safety Council. W. H. Cameron, secretary, 20 N. Wacker Drive, Chicago, Ill.

Pumpings from the Old Pit

Excerpts from the old files of PIT AND QUARRY *reveal many interesting sidelights on the activities of the pits, quarries and plants of former days. These are printed in this column each issue.*

Fifteen Years Ago

THE Dunbar Stone Co. of Detroit, Mich., found it possible to dodge the freight-car shortage by employing motor trucks to deliver crushed stone to its customers. The company also found that, in addition to facilitating the movement of its materials, it also was able to save on hauling costs.

* * *

A merger of the two leading sand-and-gravel producers at Racine, Wis., was completed with the consolidation of the Prasch Sand & Gravel Co. and the C. E. Reed Co. Officers of the merged concern were C. E. Reed, president; and Leo Schenk, secretary and treasurer.

Ten Years Ago

J. C. KING presided at a meeting of the members of the National Agstone Assn. held at Columbus, O. Coöperation with the railroads in supplying ground stone for farm-demonstration purposes was discussed in detail as a means of promoting the use of the material. A round-table discussion of the proper fineness of grinding was also on the program.

* * *

Members of the National Lime Assn. were preparing to attend the annual convention of that organization which was scheduled to take place June 14 and 15, 1922, at Cleveland, O.

* * *

Herbert Steiner was elected president of the Coplay Cement Manufacturing Co. of Coplay, Pa., succeeding Ferdinand Loeb. Other officers were S. Kuhn and A. Israel, vice-presidents; and George A. Christ, secretary-treasurer.

* * *

Current mill prices in various cement-producing districts were: Hudson, N. Y., $1.90; Fordwick, Va., $1.95; Hannibal, Mo., $1.85; Kingsport, Tenn., $1.95; Buffington, Ind., $1.70; Mason City, Ia., $1.95 and La-Salle, Ill., $1.70.

* * *

T. R. Barrows was appointed acting secretary of the National Sand & Gravel Assn., following the resignation of E. Guy Sutton.

Five Years Ago

THE Ottumwa Sand Co. completed the erection of its new dredging plant on the Des Moines River at Ottumwa, Ia.

* * *

Equipment to increase its production to 4,000 tons daily was being installed at the quarries of the East St. Louis Stone Co. Ralph E. McLean was president.

* * *

Lindley C. Morton was chosen president of the Phoenix Portland Cement Co. of Birmingham. The company had just doubled the capacity of its plant to 2,000,000 bbl. annually.

* * *

New companies just entering business included the Crystal Sand Co., Mission, Tex.; Decatur Hydraulic Sand & Gravel Co., Decatur, Ill.; Hudson Sand Co., Newburgh, N. Y.; Oregon Lime Products Co., Portland, Ore.; White River Materials Co., Hazelton, Ind.; Lone Star Gravel Co., Houston, Tex.; and Sand Point Gravel Co., Seattle, Wash.

Lime Content of Soils and Good Fertilization*

By ALFRED GEHRING

Seventy-nine per cent. of the adsorptive fixed bases in the soil consists of lime, whose proportion is of great importance. Some lack of unanimity of opinion as to the dependency of the usefulness of fertilizers upon the lime content of the soil requires explanation. Scientific investigation of this field is still undergoing rapid development. The opinions stated herewith are based upon original discoveries, especially those on the dependence of the activity of potash fertilizers upon the lime content of the soil. Much progress can be made on the usefulness of fertilizers by careful and extensive laboratory work.

Each fertilizing ingredient introduced into the soil has an effect not only by itself, but causes further changes in the soil due to the interaction of basic constituents. For example, if ammonium sulphate is introduced into the soil, the ammonia is left in adsorptive form, while the sulphate ion combines with lime, magnesia, sodium and potassium and is washed out. This washing out is arrested, if the ground is covered with growing plants. It is variously reported both that lime can be made soluble in the soil by the use of potash fertilizers and on the other hand, that this is not the case.

Ehrenberg attempted to clear up this contradiction in his Lime-Potash rule, whereas the writer tested out the other problems in Brunswick soils. First, the potash requirements of the soil were determined; the adsorptively-bound potash alone causes no decomposition so the potash content was brought into a definite relationship to the colloid content. Investigation upon the influence of the potash solubility by means of bases showed that increased magnesium content effected

(Continued on page 50)

New Incorporations

MENIFEE LIMESTONE Co., Frenchburg, Ky. Capital $5,000. Dorsey Ratliffe, Mt. Sterling, Ky., and D. R. Pieratt, Henry Wells and Ben Wells, Frenchburg, Ky.

JERSEY STONE Co., Newark, N. J. Capital $100,000. Thomas J. Allen, Harry C. Holmes and Elias A. Schenkan, Newark, and John M. Allen, Maplewood, N. J.

MERRILL GRAVEL Co., Merrill, Ia. Capital $15,000. J. Nason and J. H. Nason.

RARITAN MATERIALS Co., Perth Amboy, N. J. Capital $1,000.

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* Paper read at the February meeting of the Society of German Lime Manufacturers.

The 1932 Officers of the National Crushed Stone Association

J. R. BOYD
Secretary
(National Crushed Stone Assn.)

A. L. WORTHEN
President
(Connecticut Quarries Co., Inc.)

A. J. WILSON
Regional Vice-President
(Granite Rock Co.)

C. M. DOOLITTLE
Regional Vice-President
(Canada Crushed Stone Corp.)

T. I. WESTON
Regional Vice-President
(Weston & Brooker Co.)

A. S. LANE
Regional Vice-President
(John S. Lane & Sons, Inc.)

E. EIKEL
Regional Vice-President
(Servtex Material Co.)

RUSSELL RAREY
Regional Vice-President
(Marble Cliff Quarries Co.)

W. R. SANBORN
Regional Vice-President
(Lehigh Stone Co.)

PORTER W. YETT
Regional Vice-President
(City Motor Trucking Co.)

Personal Mention

A. E. Hodgkins, of Ashland, Wis., has purchased from **Thomas Edwards** the business of the Ashland Lime, Salt & Cement Co. Mr. Hodgkins has heretofore been connected with the Ashland office of the American Black Granite Co.

C. J. Kipper is preparing to install a crusher at his quarry located near North Buena Vista, Ia. The machine will have a capacity of 300 cu. yd. of material per day.

C. E. Glassen has resigned as manager of Plant No. 1 of the Columbia Quarry Co., St. Louis, Mo., and **C. E. Klaus** of Columbia, Ill., has been named as his successor by E. J. Krause, president.

Orvil Gould, an employee of the Wapak Sand & Gravel Co. of Celina, O., was painfully burned recently while undertaking to pour a quantity of molten bearing metal into a crusher bearing.

Alexander M. Tyree, purchasing agent of the North American Cement Corp., Albany, N. Y., was elected vice-president of the Purchasing Agents' Assn. of Eastern New York at the organization's twelfth annual meeting held at Albany.

At the annual meeting of the Allis-Chalmers Manufacturing Co., **Max W. Babb** was elected president succeeding Otto H. Falk, who was made chairman of the board. W. A. Thompson, formerly comptroller, was elected a vice-president. William Watson, general works manager, also was elected a vice-president. R. Dill was elected secretary and treasurer, and J. A. Keogh was elected comptroller. The following appointments were made: H. W. Storey, general attorney; J. A. Keogh, assistant secretary; D. A. Stewart, assistant treasurer, and A. F. Rolf, assistant secretary.

R. A. Hart, industrial secretary of the Salt Lake City Chamber of Commerce, reports that Utah is soon to have a geological and mineralogical survey. Gov. George Dern has appointed a survey board, as provided by the 1931 legislature. The board will investigate and collect information regarding the state's resources and will publish data as soon as it is compiled and verified. The Board is empowered to appoint a director and this will be done in the near future. The survey is expected to be correlated with the activities of the Utah Experiment Station at the University of Utah, which is closely associated with the intermountain station of the United States Bureau of Mines.

W. H. Drewel, president of the National Trust Bank of Charleston, Ill., has resigned to become president and manager of the Kentucky Durock Co., formed recently to exploit about 14,000 acres of rock-asphalt lands it holds under lease in Kentucky.

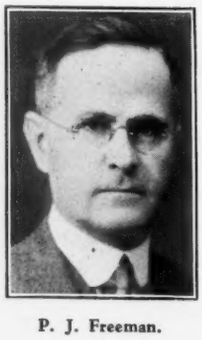
Charles W. Fullgraft of Clayton, Mo., has opened a crushed-stone quarry at Oakwood, near Hannibal, Mo.

L. E. Wood of Alhambra, Cal., has acquired a 42-acre tract near Covina, Cal., where, he announces, he will begin the immediate erection of an aggregates plant to cost approximately $30,000. Concrete building tile are also to be produced.

David K. E. Bruce of New York has been elected a director of the Westinghouse Electric & Manufacturing Co. Mr. Bruce is a lawyer with offices at 230 Park Ave., New York City. At one time he was in the United States Diplomatic Service attached to the State Department in Washington and Assistant Vice Consul at Rome, Italy. **C. E. Allen,** commercial vice-president of the Westinghouse company has recently been elected a vice-president of the American Management Assn., for the term 1932-1933.

Walter B. Holder has been named branch manager of the Boston office of The Barber-Greene Co., of Aurora, Ill., manufacturer of standardized material-handling machinery. Mr. Holder has been with the Barber-Greene Company since 1926. Prior to coming with the company, he had 11 years experience designing elevating and conveying machinery with the Underwood Machinery Company, and the Mead-Morisson Manufacturing Co. of Boston, and George P. Carver, Inc.

P. J. Freeman has returned to the Pittsburgh Testing Laboratory as consulting engineer. Mr. Freeman has been chief engineer of the Bureau of Test and Specifications of Allegheny County for many years and, in his new connection with the Pittsburgh laboratories, will specialize in problems relating to municipal construction, roads and pavements, technological control of concrete production and placement, and special investigations.



P. J. Freeman.

W. E. Neal has taken over the active management of the Plank & Neal Slate Co., **C. C. Plank** having retired from the concern. Mr. Neal will continue the business at the same address, 538 Builders Exchange, Minneapolis, Minn., and will also act as northwest branch manager of the Structural Slate Co. and the Natural Slate Blackboard Co., of Pen Argyl, Pa.

J. E. Proffitt has taken over the business of the Dayton Sand & Gravel Co., in Dayton, Ore.

L. L. Clymer has opened a $30,000 crushed-stone plant and quarry near West Jefferson, O., and twelve men have been employed.

E. C. Sherwood, specialist in steel rails, track materials and contractors' equipment, for many years located at 50 Church St., New York, has moved to larger offices at 7 Dey St., New York, N. Y.

J. S. Tritle has been elected vice-president in charge of operations of the Westinghouse Electric Supply Co., wholesale distributor of Westinghouse products to dealers, contractors and industrial establishments. He will assume his new duties immediately in addition to his present position, vice-president and general manager of the Westinghouse Electric & Manufacturing Co.

G. P. Blackiston has been appointed sales-promotion manager of the Kron Co., Bridgeport, Conn., manufacturer industrial scales. Mr. Blackiston had previously held the same position with The Wright Manufacturing Co.

J. P. Ryan has again become associated with F. H. Niles, equipment agent at Jersey City, N. J., who is continuing the business formerly operated by the Wickes Machinery Co.

Obituary

George Mitcham, 21, an employee of the Greenville Sand & Gravel Co., was drowned in the Mississippi River when he stepped overboard a dredge operated by the company.

John Franklin Pogue, well known among Ohio stone operators, died recently at his home in Findlay, O., at the age of 72. He was a native of West Virginia and up until six years ago when he retired, he was active as head of the Hancock Stone Co. Three sisters and a brother survive.

Traffic News and Comment

Recent I. C. C. Decisions

Cement.—The commission has found justified the proposed changes in rates on cement from Dallas, Harrys and Eagle Ford, Tex., to destinations in Arkansas and Louisiana. In publishing the rates Eagle Ford and Harrys were shown as separate stations and at the same time were included in the Dallas switching limits. This constituted a duplication in the publication of rates, which the commission found not justified and ordered the suspended schedules cancelled without prejudice to the filing of new schedules properly publishing the approved rates. I. & S. Docket No. 3,649. (PIT AND QUARRY, Dec. 12, 1931, p. 75.)

Examiners' Reports

Lime and Ground Limestone.—Examiner Howard Hosmer on further hearing proposes modification of the report in 163 I. C. C. 701 to authorize the addition of emergency charges, as found reasonable in Ex Rarte 103, to the rates prescribed in the first report. The failure of the Virginia commission to permit the addition of the emergency charges resulted in this further hearing. The charges are 6c. per net ton on ground limestone and 1c. per 100 lb. on lime.—I. C. C. Docket No. 19,943, Sub. 1.

New Complaints Filed

Amiesite.—Unreasonable rates on crushed stone, coated with oil, tar, and /or asphaltum, from Martinsburg, W. Va., to points in West Virginia, Ohio, New York, Pennsylvania and Maryland are alleged and reasonable rates sought in I. C. C. Docket No. 25,028, Sub. No. 1, Interstate Amiesite Co., Inc., Wilmington, Del. *v.* A. C. & Y. *et al.*

Cement.—The commission has suspended until Nov. 16 schedules in supplement No. 12 to Boston and Albany, I. C. C. 9,110, proposing to reduce the rates on cement from Hudson and Hudson Upper, N. Y., to destinations on the B. & A. in Massachusetts.—I. & S. Docket No. 3,736.

Cement and Lime.—Complainants allege rates and charges in violation of Sec. 1, 2 and 3 of the act on cement from Davenport, Ia., to Red Wing, Minn., and on cement and hydrated lime from Davenport to Goodhue, Minn., and ask that the commission award reparation. The shippers being preferred are located at Mason City, Ia., Oglesby, Ill., Gilmore City, Ia., Duluth, Minn., Buffington, Ind., Valley Jct., Ia., La Salle, Ill., Dixon, Ill., Des Moines, Ia., Illasco, Mo., Sugar Creek, Mo., Bonner Springs, Kan., and Louisville, Neb.

Crushed Stone.—The commission has suspended until Nov. 20 the schedules in supplement No. 27 to Johanson's I. C. C. No. 2,248 and Jones' I. C. C. 2,349, a joint tariff. These schedules propose to reduce the rates on crushed stone from Cape Girardeau and Marquette, Mo., to Missouri-Illinois railroad stations in Illinois.—I. C. C. I. & S. Docket No. 3,739.

Feldspar.—Violation of Sec. 1, 3 and 4 are alleged on the shipment of feldspar from Minpro and Sprucepine, N. C., to Lima, O., and a rate of $4.93 and reparation asked for. Undue preference to receivers of feldspar at Carey, Findlay, Mansfield, Canton and Massillon, O., result in violation of Sec. 3.—I. C. C. Docket No. 25,199, Davidson Enamel Product, Inc., Lima, O., *v.* D. T. & I. *et al.*

Gravel.—Unreasonable rates on gravel from Greenway, Ark., to destinations in Missouri are alleged and reparation is prayed for in I. C. C. Docket No. 25,202, Missouri State Highway Commission, Jefferson City, Mo. *v.* M. P. *et al.*

Lime.—The commission has suspended until Nov. 29, various schedules proposing to revise the rates on lime, from, to and between points in Southwestern and Kansas-Missouri territories, by substituting for the present commodity rates Col. 17½ rates, which would generally result in increases. Some of the suspended schedules are found in Johanson's tariffs; Supplement 34 to I. C. C. No. 2,291; Supplement 42 to I. C. C. No. 2,301; Supplement 14 to I. C. C. No. 2,341; Supplements 221 and 225 to I. C. C. No. 2,008; St. L. S. F. Ry., Supplement 28 to I. C. C. 9,060; E. B. Boyd's, Supplement 91 to I. C. C. A-1, 847; and several others.—I. C. C. I. & S. Docket No. 3,742.

Ground Limestone.—Violation of Sec. 1, 3 and 13, on shipments of ground limestone from Bellefonte and Pleasant Gap, Pa., to destinations in New York, are alleged and new rates asked for. The shippers preferred are located at points in New Jersey, Pennsylvania and New York.—I. C. C. Docket No. 25,220, American Lime & Stone Co., et al., Bellefonte, Pa. *v.* Pennsylvania *et al.*

Sand and Gravel.—Rates in violation of Sec. 1, 3 and 13 on sand and gravel from Siam, Tenn., to Virginia points, with competitors in the Petersburg, Va., district preferred, are alleged and new rates sought in I. C. C. Docket No. 24,840, Sub. 1, American Limestone Co., Knoxville, Tenn. *v.* Southern *et al.*

Rate-Committee Dockets

Trunk Line Assn.

Cement.—Carriers propose to amend the New York Harbor Lighterage tariffs, in so far as they apply on cement, to read: "Contents not to be less than 66 lb., or in excess of 100 lb. per bag." It is also proposed to add to the same description on cement to cover 4-ply bags the following: "Contents to be not less than 50 lb., or more than 65 lb." Docket No. M-3, 002.

Magnesite.—Carriers propose to increase the rate on caustic and/or calcined magnesite, other than dead-burned, car-load minimum weight 40,000 lb., from New York, N. Y., to Memphis, Tenn., as published in Curlett's I. C. C. A-328, from 50c. to 63c. per 100 lb.—Docket No. M-3,003.

Sand.—Carriers propose to increase the rate on sand,[1] from stations on the Pennsylvania Railroad, McDonough to Milltown, N. J., to stations in Quebec, Montreal (Place Viger) to Atwater, from $4.79 to $4.80 per net ton.—Docket No. 29,087.

Sulphur.—The establishment of a rate of 28c. per 100 lb. on crude, unground or unrefined sulphur, from Baltimore, Md., to Burlington, Ont., is proposed by carriers.—Docket No. 28,994, Sup. 1.

Tripoli.—A reduction in the rate on crude or pulverized tripoli, car-load minimum weight 40,000 lb., from St. John and West St. John. N. B., to Port Kennedy, Pa., from 55½c. to 44½c. per 100 lb., is proposed by carriers.—Docket No. 29,069.

Central Freight Assn.

Agricultural Limestone.—Carriers propose reductions in the rates on agricultural limestone, car-load minimum weight 50,000 lb., from Piqua, O., to Wheeling, Moundsville, New Martinsville, Bens Run, Parkersburg, Ravenswood, Point Pleasant, Apple Grove, Huntington and Kenova, W. Va., to $2.02 per net ton.—Docket No. 31,147.

Amiesite.—Reduced rates on crushed stone, coated with oil, tar or asphaltum, as shown below, are proposed by carriers in Docket No. 31,208.

To	Present	Proposed
Akron, O.	$1.42	$1.14
Canton, O.	1.53	1.22
Greenwich, O.	1.19	.91
Mansfield, O.	1.19	.99
Mt. Vernon, O.	1.42	1.14
Shelby, O.	1.19	.91
Tiffin, O.	1.07	.87
Youngstown, O.	1.76	1.29
Zanesville, O.	1.76	1.37

Cement.—Carriers propose to reduce the rate on cement, car-load minimum weight 50,000 lb., from Evansville, Ind., to Wilson, Wadesville, Hepburn, Oliver, Springfield, Solitude and Erwin, Ind., from 8c. to 7c. per 100 lb., to apply via C. & E. I. direct.—Docket No. 31,191.

Dolomite.—Shippers at Genoa and Martin, O., are asking that the rates per gross ton on raw or crude dolomite and fluxing stone,[1] be reduced to Corydon, Ind., to $2.40; to Terre Haute, Ind., to $2.39; and to Vincennes, Ind., to $2.65.—Docket No. 31,356.

Lime.—Shippers propose the establishment of commodity rates on common, hydrated, quick or slacked lime, car-load minimum weight 30,000 lb., from Buffalo, N. Y., to destinations in C. F. A. territory on the basis prescribed in I. C. C. Docket No. 16,170. The present rates are made by use of the equivalent table in Item 1,565 in C. F. A. Exceptions to the Official Classification, Tariff 130-U, except to short-haul territory in Ohio, Pennsylvania and West Virginia, were a few specific commodity rates reflecting the Syracuse, N. Y., rates are in effect. Docket No. 31,262.

Sand.—Carriers propose to reduce the rate on all kinds of sand from Vigo and West Junction, O., to Chillicothe, O., from 80c. to 60c. per net ton.—Docket No. 31,178.

Shippers propose the publication of a commodity rate per net ton on foundry sand from Detroit, Mich., to Oak Shade, O., of $1. and to Carleton, Mich., of 70c.—Docket No. 31,182.

A reduction in the rate on lake, river and bank sand, from Gary, Ind., to Willow Creek, Ind., to 50c. per net ton, to apply only on traffic destined to points on the M. C. R. R., routed via the Wabash R. R., is proposed by the carriers.—Docket No. 31,295.

Sand and Gravel.—The carriers propose to reduce the rate on common sand and gravel from South Lorain, O., to Wellington, O., from 80c. to 70c. per net ton.—Docket No. 31,286.

Carriers propose to publish a rate of $1 per net ton on common sand and gravel, from Oil City, Pa., to Bear Lake, Lottsville and Columbus, Pa., and 80c. to Corry, Union City, Mill Village, Miller, Cambridge Springs, Venango and Saegertown, Pa.—Docket No. 31,297.

Illinois Freight Assn.

Crushed Stone, Sand and Gravel.—The following rates per net ton on crushed stone, sand and gravel,[1] have been proposed to apply from Alton, Ill. To Machens, Mo., 70c.; White Corn, Mo., 76c.; Dardanelle, Mo., 82c.; Old Monroe, Mo., 88c.; and to Foley, Mo., 94c.—Docket No. 6,592.

Sand.—To replace the mileage scale rates per net ton which now apply on sand,[2] from East St. Louis, Ill., to the following destinations in Illinois following the rates are proposed: to Johnson City, 95c.; Jeffries, 95c.; Edgewood, $1.23; Laclede, $1.23; Farina, $1.23; Kinmundy, $1.23; Alma, $1.23; and Odin, $1.10.—Docket No. 3543-H.

Western Trunk Line Committee

Crushed or Ground Limestone.—The rates on crushed or ground limestone from Stolle, Ill., to points in Kansas, not representing any definite basis and being subject to various minimum weights, shippers propose the establishment of rates on these commodities,[1] based on 8 per cent. of the contemporaneous first-class rate. Representative proposed rates per 100 lb. are: to Kanarado, 20c.; Cedarville, 15c.; Burr Oak, 17c.; Arcadia, 13c.—Docket No. 6,025-F, Sup. 1.

Lime.—The present rate on lime, car-load minimum weight 24,000 lb., from Mankato, Minn., to Fargo, N. D., is 23c. per 100 lb. It is proposed to alternate this rate with a rate of 21c. for a car-load minimum weight of 30,000 lb.—Docket No. 4,801-E.

Feldspar.—It is proposed to provide rates from Buffalo and South Platte, Colo., to destinations in W. T. L. territory, the same as are effective from Denver, Colo. Rates from Jefferson, Colo., are to be based 50c. per ton higher than the rates proposed from Buffalo. At present the rates from these points are made by adding the class rates from these points to Denver to the rates applying from Denver published in W. T. L. Tariff 111 series.—Docket No. 4,129-R.

Southern Freight Assn.

Crushed Stone, Chert, Sand, Gravel and Slag.—Carriers propose for the account of the L. O. P. & G. R. R., and the S. Ga. Ry., the elimination of the Florida Peninsula arbitrary shown in Par. 5(c), p. 34 of Agent Spieden's Freight Tariff 408, Agent Glenn's, I. C. C. A-668, from points in the peninsula of Florida on those lines to destinations in Georgia on the S. Ga. Ry., G. & F. R. R., G. N. Ry., G. D. & F. Ry., Sou. Ry., and/or such other lines as may indicate their intention to participate on crushed stone, chert, sand, gravel and slag.—Docket No. 57,549.

For the account of the C. & G. R. R. it is proposed to eliminate the arbitrary in connection with rates on crushed stone, chert, sand, gravel and slag, in Agent Spieden's Freight Tariff 33-A, Agent Glenn's I. C. C. A-716, and in Spieden's Tariff 388, Glenn's I. C. C. A-655.—Docket No. 57,550.

Ground Limestone.—Carriers propose to eliminate the arbitrary on ground limestone from Barber, W. Va., to points on the L. & S. R. R., or between points on the L. & S. R. R., or between points on the L. & S. R. R. on the one hand and points in S. F. A. territory on the other. This arbitrary is 25c. per net ton as published in Agent Spieden's I. C. C. Nos. 1,537 and 1,488.

Sand.—It is proposed to establish through commodity rates on molding sand from Lipe, Sawyer's Mill, Hollow Rock and Camden, Tenn., to points in C. F. A. and I. F. A. territories, made on the basis of the joint-line scale prescribed by the Interstate Commerce Commission on asphaltic limestone, in I. C. C. Docket No. 23,236. A statement of the present and proposed rates with the mileage scale will be furnished on request.—Docket No. 57,673.

Sulphur.—Shippers propose a change in the rules governing the stopping in transit of cars containing sulphur to complete loading or partly to unload at points in S. F. A. territory by amending Rule 14 of Agent Spieden's I. C. C. No. 1,594 and So. Ry. I. C. C. No. A-10,440, to read in part as follows: Fertilizer and fertilizer materials, except sulphur (brimstone), in bulk in bags or in bulk, car-load minimum weight 40,000 lb.—Docket No. 57,683.

Southwestern Freight Bureau

Crushed Stone, Sand and Gravel.—Shippers propose the amendment of S. W. L. Tariff 162-D applying to crushed stone, sand, gravel, and related articles, from and to stations in Arkansas, Kansas, Louisiana, Oklahoma, Missouri and Texas, Memphis, Natchez and Vicksburg, as provided in Items 100 to 120, by extending the application of Bases Nos. 30, 31 and 32 beyond 800 mi. to 1,000 mi. at the rate of progression of 10c. per ton for each additional 30 mi. or fraction thereof, subject to the silica-sand rates (Bases Nos. 20, 21 and 22, respectively), as *maxima.* There is a contemplated movement of limestone from southeast Missouri to Texas for distances over 800 mi. It is proposed to extend the scale to include 1,000 mi. at the same rate of progression as prevails for distances over 200 mi. But since the silica-sand (in box-car) rates for over 980 to 1,000 mi. are less than the common-sand rates at this progression, it is proposed to observe the silica-sand rates as *maxima.*—Docket No. 24,651.

[1] The car-load minimum weight will be 90 per cent. of the marked capacity of the car, except that, when the car is loaded to its full cubical or visible capacity, the actual weight will apply.

[2] The car-load minimum weight will be the marked capacity of the car, except that, when the car is loaded to its full cubical or visible capacity, the actual weight will apply.

Asbestos Manufacturer Holds Strong Position

The Thermoid Co. and wholly-owned subsidiaries, makers of asbestos brake linings, etc., report for quarter ended March 31, 1932, net loss of $106,685 after depreciation, interest, etc., comparing with net loss of $101,679 in first quarter of 1931.

Current assets as of March 31, last, including $506,286 cash and government bonds, amounted to $1,919,512 and current liabilities were $247,430. This compares with cash of $603,718, current assets of $2,115,847 and current liabilities of $333,369 on December 31, 1931.

A new rock-crushing plant is being erected near Whitewater, Cal. The Palm Springs Builders' Supply Co., of which Earl B. Gilmore, president of the Gilmore Oil Co., and A. F. Hicks of Palm Springs are stockholders, is installing the crusher.

Financial News

The information contained in these financial pages is given with the understanding that any statement on the part of this magazine or any of its staff, as to the responsibility or standing of any person, firm or corporation, or as to the value of any property or securities is a mere expression of opinion, given as a matter of service to the readers of PIT AND QUARRY, *for which no responsibility in any way is to attach to this magazine or to any of its staff.*

Calaveras Cement Head Reports $25,785 Profit

A profit before depreciation, depletion and extraordinary charges of $160,697 is reported by Calaveras Cement Co. for the year 1931. The net carried to surplus after these charges was $25,785 against a net of $91,291 for 1930.

"The company's strong financial position has been maintained, cash on deposit at the end of the year amounting to $684,091 as compared with $695,896 at the close of the previous year," stated Arthur B. Shelby, vice-president and general manager, in his report.

Ratio of current assets to liabilities was improved from 11.4 to 1 in 1930 to 13.20 to 1 for 1931. During the year a total of $149,813 was disbursed in the form of preferred stock dividends, $58,000 was invested during the year in the company's own preferred shares.

Indiana Limestone Co. Extends Deposit Time

Time limit for deposit of bonds and debentures of the Indiana Limestone Co. under its recent reorganization plan has been extended from May 1 to June 1 by the reorganization committees.

To date there have been deposited approximately 80 per cent. of the 15-yr. first-mortgage bonds and around 70 per cent. of the 10-yr. sinking fund gold debentures.

Penn-Dixie Cement Corp. Feels Effect of Slump

The Pennsylvania-Dixie Cement Corp. reports for the twelve months ended March 31, 1932, operating profit of $553,227 comparing with $2,594,627 in the twelve months ended March 31, 1931, and net loss of $1,455,699 after depreciation, depletion, interest, etc., comparing with net income in the preceding year of $467,202, equivalent to $3.44 a share on 135,888 shares of 7 per cent. preferred stock.

Current assets as of March 31, last, including $2,864,982 cash and short term securities, amounted to $5,406,465, against current liabilities of $245,074.

Consolidated income account for twelve months ended March 31, 1932, compares as follows:

	1932	1931	1930
Operating profit.	$ 553,227	$2,594,627	$2,479,723
Depreciation and depletion	1,390,534	1,381,716	1,393,314
Interest	618,392	657,754	700,285
Federal taxes	.....	87,955	56,988
Net loss	$1,455,699	*$467,202	*$329,136

* Profit.

N. Y. Trap Rock Shares Earned $4.40 for Year

The New York Trap Rock Corp. reports its consolidated income for 1931 and its balance sheet as of December 31, 1931, as follows:

Income Account

	1931	1930
Gross operating profit	$2,552,303	$3,324,393
Administrative, selling and general expense	452,834	440,099
Depreciation	523,019	478,045
Depletion	24,713	31,450
Operating income	1,551,738	2,374,799
Other income	64,199	60,264
Total income	1,615,937	2,435,063
Fixed charges	367,333	393,254
Balance	1,248,604	2,041,809
Federal taxes	215,287	297,992
Reserve for bad debts	31,499	39,375
Other charges	62,308	72,722
Minority interest	7,541	11,268
Net income	931,969	1,620,452
Preferred dividends	105,567	140,000
Surplus	$ 826,402	$1,480,452
Earned per share, common.	$4.40	$8.22

Number of common shares, 180,000.

Balance Sheet

Assets:	1931	1930
Property and plants	$19,450,012	$19,222,151
Current assets:		
Cash	*1,029,550	1,138,762
Marketable securities	†76,549	13,335
Accounts and notes receivable (net)	1,624,089	1,614,344
Inventories	703,785	668,937
Deposits, etc	209,783	155,813
‡Reacquired preferred	768,550	.....
Deferred charges, etc.	27,714	25,183
Total	$23,890,031	$22,838,525
Liabilities:		
Preferred stock	$ 2,000,000	$ 2,000,000
Common stock	5,875,925	5,875,925
Minority interest	104,761	97,220
Funded debt	5,810,500	6,210,500
Current liabilities:		
Reserve for taxes	135,081	244,207
Notes and accounts payable and accruals	692,185	501,224
Reserve for compensation insurance	151,391	129,941
Reserve for depreciation and depletion	2,542,877	2,016,410
Capital surplus	322,836	330,336
Earned surplus	6,254,475	5,432,762
Total	$23,890,031	$22,838,525
Current assets	3,433,972	3,435,378
Current liabilities	827,266	745,431
Working capital	$ 2,606,706	$ 2,689,947

* Including $7,668 in closed bank. † At market. ‡ Consists of 8,090 shares at cost.

Glass-Sand Producer's Working Capital Gains

The Pennsylvania Glass Sand Corp. of Lewistown, Pa., reports its balances for the year ending December 31, 1931, (as compared with December 31, 1930) as follows:

Assets

	1931	1930
Property, plant, etc.	$13,637,990	$14,011,200
Current assets:		
Cash	231,109	189,712
Accounts and notes receivable	434,937	447,784
Inventories	121,503	127,680
Securities	424,190	450,431
Deferred accounts	333,111	367,231
Sinking fund	64,072	86,949
Total	$15,246,912	$15,680,988

Liabilities

Capital and capital surplus	$ 8,669,878	$ 8,984,482
Earned surplus	986,855	1,000,334
Bonded debt	4,580,000	4,694,000
Current liabilities:		
Accounts payable	194,506	199,125
Accrued accounts	18,865	41,803
Interest and dividends payable	181,584	185,021
Reserves	615,224	576,222
Total	$15,246,912	$15,680,988
Current assets	1,211,739	1,215,607
Current liabilities	394,955	425,949
Working capital	$ 816,784	$ 789,658

North American Cement Had Net Loss for Year

North American Cement Corp. reports for the twelve months ended March 31, 1932, net loss was $570,302, after taxes, depreciation, depletion, interest and amortization. For the twelve months ended Dec. 31, 1931, net loss was $496,520, after the above deductions.

CURRENT DIVIDENDS

Company	Class of Stock	Dividend Rate	Holders of Record	Payable
Arundel Corp.	Common	$0.75 qr.	Mar. 23	Apr. 1
Boston Sand & Gravel	Common	$0.15 qr.	Mar. 22	Apr. 1
Boston Sand & Gravel	Preferred	$0.87½ qr.	Mar. 22	Apr. 1
Calaveras Cement	Preferred	$1.75 qr.	Mar. 31	Apr. 1
Cleveland Quarries	Common	$0.10 qr.	May 15	June 1
Consolidated Sand & Gravel	Preferred	$1.00 qr.	Apr. 30	May 16
Dufferin Pav. & Crushed Stone	Preferred	$1.75 qr.	Mar. 24	Apr. 1
Fitzsimons & Connell	Common	$0.50 qr.	May 21	June 1
Great Lakes Dredge & D.	Common	$0.25 qr.	May 4	May 14
Hazle Atlas Glass	Common	$0.25 extra	Mar. 19	Apr. 1
International Salt	Common	$0.50 qr.	Mar. 15	Apr. 1
Johns-Manville	Preferred	$1.75 qr.	Mar. 11	Apr. 1
National Gypsum Co.	Preferred	$1.75 qr.	Mar. 19	Apr. 1
Owens-Illinois Glass	Common	$0.50 qr.	Apr. 29	May 15
Owens-Illinois Glass	Preferred	$1.50 qr.	June 1	June 15
Pacific Portland Cement	Preferred	$1.62½ qr.	Mar. 31	Apr. 5
Pennsylvania Glass Sand	Preferred	$1.75 qr.	Mar. 25	Apr. 1
Pittsburgh Plate Glass	Common	$0.25 qr.	Mar. 10	Apr. 1
Riverside Portland Cement	Preferred	$1.50 qr.	Apr. 15	May 1
Standard Paving & Materials	Preferred	$1.00 qr.	Apr. 30	May 16
Superior Portland Cement	Class A	$0.27½M	May 23	June 1
Wallace Sand, Ltd.	Preferred	$1.50 S.A.	Mar. 31	Apr. 15
Warner Co.	1st Pfd.	$1.75 qr.	Mar. 15	Apr. 1

Review of Foreign Practice

Sand-Lime-Brick Plant Employs "Bin" Process

German sand-lime brick plants have been gradually tending to the use of comparatively uniform manufacturing practices. In 1908 five different processes were in common use, after the war these had been reduced to three, and at present practically all new plants follow one of two processes. These are the "slaking-trommel" and the "bin" processes, of which the first is in general preferred for the larger plants and the latter for those of moderate size, although the "bin" process is by no means impractical for larger capacities.

One of the recent German plants using the bin process is the Trampke works of the Kalksandsteinwerk Lindenberg G.m.b.H. at Lindenberg near Stargard, Pomerania, equipped by the Dorstener Eisengiesserei und Maschinenfabrik Akt.-Ges. Sand is excavated from an adjacent pit and carried up an inclined conveyor to a sand-bin at the top of the plant. Lime is purchased, already hydrated and separated by air, from a lime producer. The sand and lime are measured in an automatic proportioning device, mixed along with water in a trough mixer, and stored in a large bin of multiple compartments. Each compartment has a hopper bottom and a sliding gate through which the material falls to a table feeder serving a second mixer; after this mixing the mass is fed to a fall press where it is formed into bricks. The plant in its present initial development has one press and one hardening kettle of 2 m. diameter and 16 m. long. Steam is furnished by a fire-tube boiler of 70 sq.m. heating surface, and power by a 30-hp. motor.—B. Krieger in *Tonindustrie-Zeitung* 56:188-189, Feb. 11, 1932.

Cement Formulae Await Adaptation to Practice

The quality of Portland cement depends on three factors: (a) the physico-chemical state of the raw materials and of the raw mix; (b) the chemical composition of the raw mix; and (c) the clinkering. These factors are very closely related to each other, and a variation in one entails a variation in the others. Under ordinary plant conditions the first and third factors are practically constant and it is only the chemical composition which can be modified if required to keep up the quality of the cement. In practice, too, the correct chemical composition must be found and maintained for each raw material and for each plant (or, if the plant uses kilns of different systems, for each kiln). It is often observed that two kilns of different systems operated in the same plant and using the same raw materials behave differently and yield cements of different qualities.

At the cement plant at Azuga, Rumania, where the writer is chief chemist, it has been observed that changes in the grinding plant have made it necessary to change the chemical composition of the raw mix in order to yield cement of the same quality under the previous conditions of clinkering. Likewise, the replacement of an ordinary rotary kiln 50 m. long and 2 m. in diameter by one with an enlarged zone 50 m. long and 2.70 and 2 m. in diameter made it necessary to change the chemical composition of the raw mix to suit the changed conditions of clinkering. Every kiln must thus be fed with a mix, the composition of which is determined specifically for the physico-chemical state of the raw mix and the clinkering method involved.

This, of course, argues against the literal use of the theoretical formulas for the composition of cement, which to be of value must be adapted to practical needs by coëfficients of correction. Even one of the most distinguished investigators of the algebraic formulas for cement composition, Dr. Hans Kühl, has pointed out that the "perfect" raw material supposes a "perfect" mechanical handling, but that, since practical conditions do not attain this perfection, certain compensations for this fact must be made. The absolutely rigid composition formulas, of the type offered by J. Hendrickx, are inapplicable for the very reason of their rigidity. However, Hendrickx' method of "aptitude to burning" opens a new path, and may lead to a method by which the composition can be scientifically computed with regard to the practical factors involved.—N. Nicolaesco in *Revue des Materiaux de Construction* No. 269, pp. 45-47, Feb., 1932.

Difficulties Loom for Spanish Price Fixing

A recent governmental decree in Spain sets up an Assessing Commission for the Cement Industry, one function of which is to be the "fixing of sales prices, taking into account the true cost of production," thus handling in a single line a question which in reality is one of great complexity. If the manufacture of cement in Spain were concentrated in one factory, or if all plants employed the same materials and followed identical manufacturing processes, the determination of the true costs of production might be a simpler matter, but in actuality the components of the cost of cement (which this article discusses at length under the headings of raw materials, fuel, labor, maintenance and power) are subject to rather wide fluctuations. If the capital charges are added to these the complexity is still further increased. If the object of the decree is to obtain a reduction in the present costs it can scarcely accomplish its end without harm to the cement industry. The commission may be able to avert unjustified increases, although increases in the cost of materials such as fuel would naturally have to be reflected in the cost of cement.—Patricio Palomar Collado in *Cemento* (Barcelona) 4:76-84, March, 1932.

Rebuilt Plaster Plant Includes Improved Kiln

In the rebuilding of a gypsum plaster plant in the vicinity of Marseilles a complete installation of a latest-type continuous vertical outside-firebox kiln and auxiliary equipment was made. This type of kiln is distinguished among gypsum kilns in use in France by high economy and high quality of the product. The gypsum worked is of quite ordinary quality; it is mined in underground galleries, lifted up a vertical shaft to the surface, and dumped by hand into a jaw crusher, which reduces it to pieces of 2½ in. and down, ready for calcining. From a storage-bin the crushed gypsum is elevated to a rotary screen with metal cloth of 25-mm. (1-in.) openings; the coarse pieces retained on this screen are elevated to the charging port of the kiln. The plaster dehydrated in the kiln, which has a capacity of 2½ metric tons an hr., is drawn by means of a screw-conveyor, is stored in bins, and, when needed, is elevated to a grinding mill. The product is classified in an air-separator, the coarse being returned to the mill and the fines being deposited in a bagging machine.

The fine material passing the 1-in. metal-cloth screen preceding the calcining kiln and the *débris* from the grinding are utilized as calcium sulphate for agriculture. For this purpose the fines are spouted to a hexagonal double-surface screen, producing two sizes of product. The coarse material rejected on this screen is fed to a hammer-mill and the flour is returned to the screen.—H. Schmitt in *Revue des Materiaux de Construction*, No. 269, pp. 47-52, Feb., 1932.

Sale of the physical assets of the Ready Mixed Concrete Co. of Knoxville, Tenn., for $6,820 to the American Limestone Co. was reported in chancery court at Knoxville recently by R. S. Campbell, receiver. He asked that the court approve the sale, which was done.

Recent Patents

AMERICAN

Cars

Mine car. Hugh W. Sanford and Perry S. McCallen, Knoxville, Tenn. No. 1,851,214.

Mine car. Ralph E. Dendler, Berwick, Pa., assignor to American Car & Foundry Co., New York, N. Y. No. 1,851,695.

Cement

Method of manufacture of Portland cement. Paul R. Whelan, St. Louis, Mo. No. 1,852,547.

Portland-cement composition and method and material for making same. Harold H. Steinour, Riverside, Cal., assignor to Riverside Cement Co., Los Angeles, Cal. No. 1,852,595.

Concrete

Concrete conveying bucket. Theodor Wagener, Rodenkirchen-Cologne, Germany. No. 1,851,074.

Loader-agitator for concrete-mixing machines. Joseph Eggert, Columbus, O. No. 1,851,242.

Stabilizing means for concrete-mixers. Arthur P. Robinson, Plainfield, N. J., assignor to Ransome Concrete Machinery Co., same place. No. 1,852,436.

Lock for tilting-drum concrete mixers. Charles F. Ball, Milwaukee, Wis., assignor to Chain Belt Co., same place. No. 1,853,110.

Process of making concrete and cement mortar. Roy Cross, Kansas City, Mo., assignor to Silica Products Co., same place. No. 1,854,180.

Crushing and Grinding

Roch crusher. Alvah D. Hadsel, San Francisco, Cal. No. 1,854,256.

Pulverizer. Gustav H. Kaemmerling, Erie, Pa., assignor to Erie City Iron Works, same place. No. 1,854,844.

Unit pulverizer. Austin A. Holbeck, Lakewood, O. No. 1,855,171.

Crusher. Ralph D. Nye, Wheeling, W. Va., assignor to Smith Engineering Works, Milwaukee, Wis. No. 1,851,109.

Drilling

Rock drill. William A. Smith, and William A. Smith, Jr., Phillipsburg, N. J., assignors to Ingersoll-Rand Co., Jersey City, N. J. No. 1,852,591.

Valve for rock-drills. William A. Smith, Phillipsburg, N. J., assignor to Ingersoll-Rand Co., Jersey City, N. J. No. 1,852,593.

Excavating

Excavating machinery. Robert L. Brown, Milwaukee, Wis., assignor to Harnischfeger Corp., same place. No. 1,851,346.

Back-digging shovel. Mitchell L. Fykse, South Milwaukee, Wis., assignor to Bucyrus-Erie Co., same place. No. 1,852,156.

Excavating apparatus. Arthur Orloff, Green Bay, Wis., assignor to Northwest Engineering Corp., same place. No. 1,852,258.

Power shovel. Paul Burke, Green Bay, Wis., assignor to Northwest Engineering Corp., same place. No. 1,852,289.

Bucket construction. John W. Page, Chicago, Ill. No. 1,852,671.

Grab. Dudley J. Barnard, Barking, England. No. 1,853,250.

Excavating machine. John H. O'Brien, Osage, Wyo. No. 1,853,923.

Grapple. Howard C. Barbour and Roy H. Zeilman, Elyria, O., assignors to Thew Shovel Co., Lorain, O. No. 1,854,325.

Means for dredging, excavating, and conveying materials. Alexander G. Rotinoff, London, England. No. 1,854,383.

Materials Handling

Skip-loading apparatus. Hubert E. Baker, Muskegon, Mich., assignor to Brady Conveyors Corp., Chicago, Ill. No. 1,853,190.

Bucket clean-out mechanism for conveyors. William H. Bosworth, Yonkers, N. Y., assignor to George Haiss Mfg. Co., New York, N. Y. No. 1,853,717.

Miscellaneous

Apparatus for preparing sand mixtures. Lewis E. Smoot, Washington, D. C. No. 1,851,115.

Sand-and-gravel cleaner. George E. Keene, Mankato, Minn. No. 1,851,186.

Process and apparatus for mining. Edwin E. Claytor, New York, N. Y. No. 1,851,565.

Feeding device. William A. Smith, Phillipsburg, N. J., assignor to Ingersoll-Rand Co., Jersey City, N. J. No. 1,852,592.

FOREIGN

Blasting and Explosives

Mine-charging device. Ingersoll-Rand Co., New York City, assignee of Charles C. Hansen, Easton, Pa. Canadian 321,069.

Detonators for blasting cartridges. Edm. von Herz, Köln-Dellbrück. German 547,685.

Concrete and Concrete Products

Concrete walling blocks. W. T. Warren. British 369,322.

Centrifugal-casting process for the manufacture of articles of cement, concrete and other plastic masses. G. Pemetzrieder, Berlin-Tempelhof. German 546,902.

Drilling

Portable drills. Consolidated Pneumatic Tool Co., Ltd., and G. Scott. British 368,508.

Valve constructions for pneumatic tools. Climax Rock-Drill & Engineering Works, Ltd., and E. Penberthy. British 368,977.

Noise-suppressing device for pneumatic tools. Aktiebolaget Atlas Diesel. British 368,973.

Drill-sharpeners. W. W. Triggs (Ingersoll-Rand Co.). British 369,059.

Pneumatic tools. N. Francois. British 369,421.

Excavating

Excavating machine. L. Hammer. French 714,457.

Excavating apparatus. Hollandsche Aanneming Maatschappij Naamlooze Vennootschap. British 369,380.

Grab buckets. S. H. Priestmann. British 369,637.

Material-Handling

Conveyors. A. E. Jenks & Cattell, Ltd., and A. E. Jenks. British 368,712.

Belt conveyors. A. M. Morison and W. J. Leonard. British 369,383.

Apparatus for feeding or charging coal or other granular material. S. R. Illingsworth and Illingsworth Carbonization Co., Ltd. British 369,658.

Conveyors of the worm type. H. Simon, Ltd., and C. Ledger. British 369,727.

Conveyor mechanism for plaster board. Canadian Gypsum Co., Ltd., Toronto, Ont., assignee of Floyd R. Quick, Ft. Dodge, Iowa. Canadian 321,205.

Screening and Separating

Jigging mechanism for sieves, conveyors and like apparatus. F. Krupp Grusonwerk Akt.-Ges. British 369,492.

Screening apparatus. T. B. Wilkinson. British 369,665.

Apparatus for sorting granular materials. K. Wolinski. British 369,706.

Gravel-processing apparatus. William H. Allswede, Hersey, Mich. Canadian 320,925.

Apparatus for grading granular material. Harold R. Lewis, Hoopestown, Ill. Canadian 321,156.

Electrical precipitator. International Precipitation Co., Los Angeles, Cal., assignee of Harry A. Wintermute, Plainfield, and Carl W. Julius Hedberg, E. Bound Brook, N. J. Canadian 321,459.

Electrode for electrical precipitator. Siemens-Schuckertwerke Akt.-Ges., Berlin-Siemensstadt. German 547,106.

Precipitating electrode for electric filter. Metallgesellschaft Akt.-Ges., Frankfurt a. M. German 547,350.

PIT AND QUARRY *will furnish, at its actual cost, a copy of any patent cited here. A charge of ten cents per copy is made by the U. S. Patent Office, Washington, D. C., and readers may procure a copy directly by addressing the Commissioner of Patents, with payment for copies requested. Postage stamps are not accepted by the Patent Office. We will endeavor to obtain copies of foreign patents for our readers but we cannot give assurance in every case for the reason that copies of such patents are not printed for distribution as liberally as are the American copies, nor is there a fixed charge per copy.*

Manufacturers' Publications

Each publication listed below contains information of interest to nonmetallic mineral producers. Readers may obtain, without charge—except where a price may be stated—and without obligation, copies of any of these publications by writing directly to the manufacturers who publish them. Please mention PIT AND QUARRY *when writing.*

Boilers

Boiler Catalog. 48 p. (Bull. B-32-3. Foster Wheeler Corp., New York, N. Y.) Describes sectional-header, bent-tube and marine-type boilers made by this firm and illustrates how the various units are applied to complete steam-generating units.

Electrical Equipment

Type AB "De-Ion" Circuit Breakers. 8 p. (Bull. C-1937. Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.) Describes and illustrates a line of low-voltage circuit breakers handling up to 50 and 225 amperes. The breakers are built on the "De-Ion" principle of arc extinction for the replacement of open knife switches and air circuit breakers.

Engines, Diesel

Superior Diesel Stationary Engines. 6 p. (Bull. No. 124. Superior Engine Co., Springfield, O.) Describes and illustrates a stationary Diesel engine of the 4-cycle, solid-injection, cold-starting type.

Lubrication Seals

They Shall Not Pass. 16 p. (Aetna Ball Bearing Mfg. Co., Chicago, Ill.) Diagrams show the application of a simple new type of oil seal on various machinery where it is necessary to eliminate leakage along shafts and to keep dirt and water out of bearings. Tabulations of sizes with dimensions are included.

Metals

Chrome-Vanadium Nitriding Steel. 8 p. (Bull. CV-1. Electro Metallurgical Co., New York, N. Y.) Describes and illustrates the properties and advantages of nitriding steel containing chromium and vanadium and the possibilities for the industrial utilization of the alloy.

Motor Trucks

Like Giant Arms. 4 p. (The Hug Co., Highland, Ill.) A new bulletin which features the "rocker bar" type of frame construction with compensating rear springs, used on the heavy-duty motor trucks made by this concern.

Six-Wheel Trucks for Heavy-Duty Hauling. 6 p. (The White Co., Cleveland, O.) Contains specifications and illustrations of a series of six-wheel motor trucks supplied in three models for transporting sand and gravel, crushed stone, concrete, etc.

Power Transmission

Medart Power Transmission Equipment. 40 p. (The Medart Co., St. Louis, Mo.) Describes and illustrates a complete range of equipment for the transmission of power including pulleys, rope drives, shafting, chain and sprockets, hoisting sheaves, couplings, and belt tighteners. Contains useful tables on horsepower transmission.

Strike at the Root of Production Waste. 4 p. (Reeves Pulley Co., Columbus, Ind.) A mailing broadside presenting the outstanding facts regarding the variable speed transmission units produced by this company which are available in sizes from fractional to 125 hp. and in speed ranges from 2:1 to 16:1 ratios.

Rebuilt Equipment

Stock List No. 134. 32 p. (Equipment Corporation of America, Chicago, Ill.) Lists a wide variety of rebuilt equipment for quarries, sand-and-gravel plants, etc. Among the more important groups are air compressors, bins with batchers, excavators, hoists, concrete mixers and pumps.

Trailers

The Original Extra-Capacity Trailer. 4 p. (G. H. Williams Co., Erie, Pa.) Describes and illustrates a low slung trailer for transporting excavators and other heavy machinery.

Truck Bodies

Wood Heavy-Duty Dump Bodies. 8 p. (Bull. No. 3. Wood Hydraulic Hoist & Body Co., Detroit, Mich.) Describes and illustrates a line of all-steel dump bodies for trucks. Built in sizes from 2 to 8 cu. yd. capacity for mounting on any chassis.

Wire Rope

The Cardinal Reasons Why You Save Money. 24 p. (American Cable Co., New York, N. Y.) Short text matter and graphic illustrations are used in this informative booklet to tell the story of the advantages of "Tru-Lay" preformed wire rope.

Lime Content of Soils and Good Fertilization

(*Continued from page 42*)

no alteration in the potash solubility and that, while a fluctuating ammonia certainly causes a change in the solubility of soil-potassium, it is of slight importance practically, because it forms saltpeter very rapidly.

From a practical standpoint, only the lime content has an influence upon the decomposition of the potassium in the soil, which is influenced by side action of other fertilizing materials. Investigation of the influence of potassium fertilizers, containing potassium chloride, potassium sulphate and sylvinite, shows that the relationships are decidedly complicated. The statement that the potassium fertilizers are phyisiologically acid has been disputed from many sources as, for example, Kappen, Rössler and Schmidt. According to these investigators there is no difference in the pH value of the various potassium fertilizers, such as potassium chloride, potassium sulphate, potassium sulphate-magnesia, and sylvinite. Many fertilizers are applied in conjunction with potassium sulphate-magnesia. In Holland such a trial was made with systematic tamping down of the soil in order to determine the effect of magnesia. Potassium sulphate-magnesia and kainit showed a good effect upon potassium; it is possible, therefore, to avoid the damaging effect of the soil acid upon fertilizing materials by the use of magnesia. The question how the magnesia effects this change is not yet conclusively determined. According to Rössler, magnesia takes up the phosphoric acid, but the view of the writer is that, with increasing doses of lime, magnesia and potash become less soluble. When there is sufficient lime content of the soil the magnesia effect does not occur; only with a very low lime content does the magnesia content decrease, that is react. According to the writer's view, ionic "antagonism" plays a part in this relationship. Furthermore, the nitrogenous fertilizers also have an important influence.

So far as concerns the question of whether it is better to use lean or caustic lime, this depends upon the price and the effect desired, as well as on the amount of these fertilizing materials used. For it is not possible to determine the definite amount of lime for special grains and fruits. The correct amount of lime to be used can only be determined by investigation of the soil. Each variety of soil will be affected by a definite quantity of lime. The difference in use between lean lime and the other forms of lime consists of this: In heavy soils the difference in the effect of marl, burned lime and lean lime can not be determined in terms of the proper amount used in properly ground form. In light soils caustic lime works better than marl and lean lime which give about the same results. So it can be seen that it is the price of these materials after all that determines which one should be used.

Iowa Fixes Rate Charge on Gravel from Streams

The Iowa State Conservation Commission, Des Moines, Ia., has fixed a rate charge on tonnage of sand and gravel taken from state streams.

In the Des Moines River producers are being assessed 3 c. per ton for all material thus taken according to leases signed. One such lease has been negotiated on behalf of Wapello County, material to be taken in the vicinity of Chillicothe and used in road work on the secondary system of highways.

New Machinery and Supplies

New Two-Stage Crusher Complete Reduction Unit

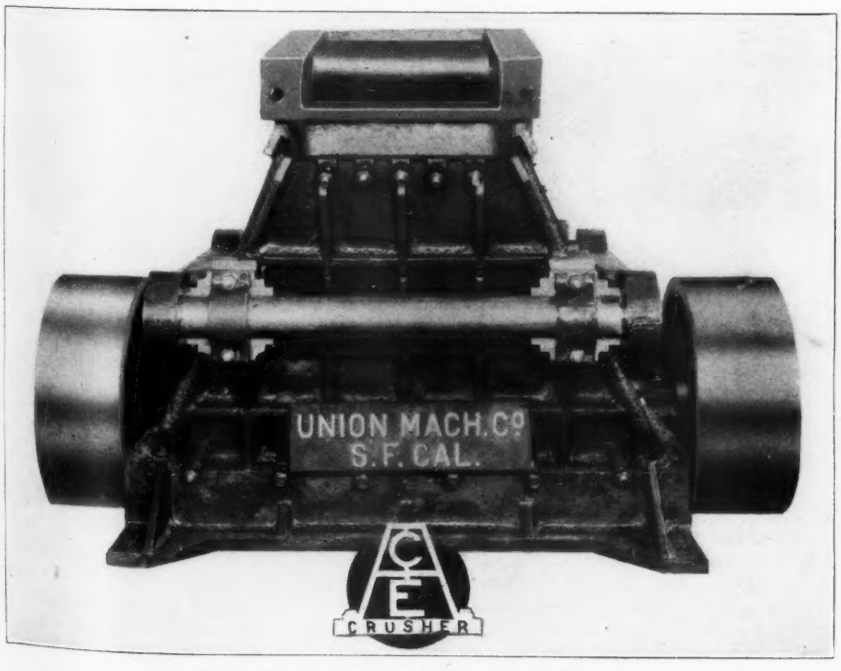
The Ace crusher has been developed by Aggregates Crushing Equipment, 934 Brannan St., San Francisco, Cal., after much research and experiment, to fill the increasing demand for a simple unitary machine that will receive average pit- or quarry-run rock, and, at one pass, reduce it to fine road surface size—eliminating the excess of dust and chips, producing a more uniform, cubiform aggregate, and at the same time give a high capacity efficiently—and still be light enough to be readily portable. Results from actual operation prove that all of the above objectives, together with added advantages, were obtained to a degree exceeding all expectations. Combined in this machine are the most desirable features of the oldest and most practical crushers, plus certain new but thoroughly practical and proved ideas.

An adjustable intake opening allows adjustment so as to receive rock from 8 in. by 20 in. when closed down, to 12½ in. by 20 in. when fully opened. By keeping the intake closed merely to pass the maximum rock to be crushed, the crushing begins at a higher point on the dies, which results in greater crushing efficiency, and more even wear on the die faces.

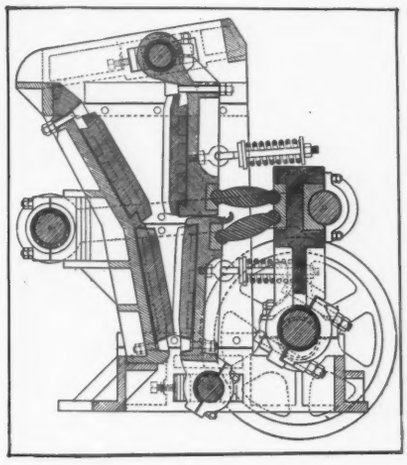
The distance between the pivot housing at the top of the primary jaw, and the top of the opposed die is less than the distance between the top ends of the movable die, and the stationary die. This eliminates clogging with oversize rock, as any rock passing this point is certain to drop far enough to be crushingly engaged between the opposed dies.

The capacity of any crusher is in proportion to the outlet opening. The Ace crusher is so graduated (from 20 in. wide at the top to 54 in. wide at the bottom) that the crushing-surface area increases practically in proportion to the number of pieces of material to be engaged. The outlet opening, when set to 1 in., is equal to the amount of solid rock (by volume) that can be fed into the intake opening from average pit- or quarry-run material. This allows freer scavenging of the rock as it progresses downward and eliminates packing and intergrinding of pieces already to size, thereby eliminating fine chips and dust. This allows the crusher to be constantly fed to its full volumetric capacity without fear of choking or packing and results in a saving of power, facilitates uniformity of product, besides increasing the life of the die faces by spreading the material over the larger crushing surface area.

The die plates are so designed that three pieces constitute a complete jaw face. The central triangular section is securely clamped in abutting relation to the two parallelogramic side sections. When worn beyond use there is a minimum of metal to be scrapped. The side sections are invertable and may be turned end for end in place, or on the opposite jaw. This means long life and economy of die costs as these dies can be completely worn out before replacement. All die sections are replaceable through top opening.



The new two-stage crusher. Note its trapezoidal shape.



Cross-section of the crusher.

The corrugations on the die faces are so arranged that they mesh, making the space between the dies constant at all points in a horizontal plane, which at the outlet acts as a gauge. This meshing eliminates slabs and oversize passing and increases the length of the outlet opening.

Further information may be had by writing the company at its offices in San Francisco.

B. & O. Converts Hopper Cars to Bulk Carriers

The Baltimore & Ohio Railroad Co. has recently converted some of its hopper dump cars into specially designed cars for the transportation of cement in bulk.

The arrangement consists of four hoppers, two on each side of centers of car, with an opening 13 in. by 24 in., each hopper being equipped with a sliding door, which forms the most satisfactory method of unloading, as the cement is delivered to cross-conveyors which extend crosswise of the tracks.

The roof has eight doors, four on each side, to provide for loading and also to assist in agitating the load if necessary when cars are being unloaded.

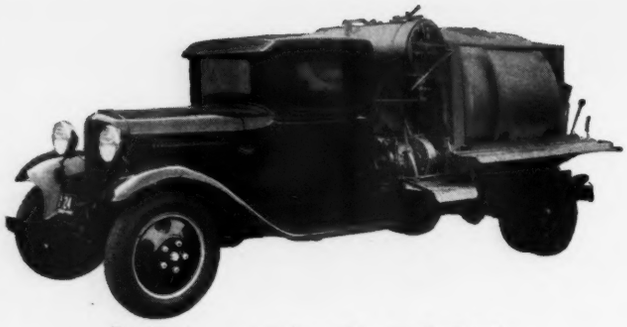
The cars are of 50-ton capacity and can also be used for hauling sand, and other materials in bulk.

Truck Mixer Mounted on New 1932 Ford Chassis

A higher speed truck mixer for both the contractor and the commercial concrete plant is offered in the 1932 Jaeger 1 and 1½ cu. yd. units mounted on the 1932 Ford chassis. The 1-cu.yd. unit is furnished for 132-in. wheel-

bases and is driven direct from the truck engine. The 1½-cu. yd. unit is furnished with separate engine drive for the 157-in. wheelbase chassis.

With the greater speed of the new Ford, these truck mixer units are ideal for express service use by commercial concrete plants.



Truck mixer mounted on the new Ford body.

New Nonmetallic Switch Hook Safe in Operation

A new switch hook that promotes safety in station operation has been announced by the General Electric Co. This hook is composed entirely of insulating material, and gives, therefore, maximum protection against accidental contact.

Inasmuch as the present trend in the design of switching equipment is towards reduction in space, this new switch hook should be particularly appealing to the operator, minimizing as it does the possibility of accidental contact between live parts of adjacent switches or between live parts and framework.

Superintendent's Ideas Prove Production Aids

When assigned to the position of superintendent of the Superior Material Co. at Lisle, Ill., Fred Herkel was told that production had to be stepped up, although operating costs had to be lowered. Here are some of the things he did:

Fred Herkel.

It required another man besides the engineer to ride the engine and pull the trip on the dump car at the proper place to discharge the load and get the car back into position after dumping. The illustration shows a rail placed at the side in such a manner that, as the car approaches the grating, the trip is lifted and the car dumped automatically. By tipping the rails on the return journey, the car is forced back to loading position by gravity.

The sand and gravel deposit is along a river, and contains considerable quick sand. The material is taken out by a Link Belt drag-line, and the run to the plant on the dump car is about 150 yards. This means that the material is quite wet when dumped, and it slid quite a bit on the conveying belt to the plant. By lowering the pitch of the belt 29 in., the slipping was eliminated, and production increased nearly 50 per cent.

With other changes and economies the plant now produces 850 cu. yd. of sand and gravel per day with only four men besides Supt. Herkel. This may be one reason why the plant has been operating summer and winter, and has orders ahead even in times like these.

Device for automatically dumping the car.

Edwin H. Conrades, 70, Dies at St. Louis, Mo.

Edwin H. Conrades, president and organizer of the St. Louis Material & Supply Co. of St. Louis, Mo., died April 20 following an attack of bronchial pneumonia. He was 70 years old.

E. H. Conrades.

Mr. Conrades was well known among aggregates producers. A native of St. Louis, he began his career in the business years ago when he became interested in the Colorado Sand Co. at St. Louis, which was later absorbed by the Union Sand Co. In 1917 Mr. Conrades organized the St. Louis Material & Supply Co., opening a gravel plant at Pacific, Mo., and several distributing yards in St. Louis. In 1920 the production capacity was doubled and, six years later, was again increased to four times its original output. A new plant on the Mississippi River was recently acquired and is just preparing to operate.

Mr. Conrades remained active in business and in the pursuit of recreation just prior to his last illness. He was an ardent golfer and loved to hunt, playing the courses about St. Louis regularly and making frequent hunting trips during the open seasons.

Nonmetallics Rate High in Value of Production

Production of sand, gravel, cement and stone accounts for nearly one-half of the value of California's mineral production, excluding petroleum and natural gas, according to *California Mineral Production for 1930*, just published in book form by the Division of Mines of California.

The total value of all minerals produced in 1930 was $69,345,809, not including gas and petroleum. Of this amount, $14,575,731 represents cement, and $17,938,778 crushed-stone, sand and gravel.

Acquires Manufacturing Rights to Lubricators

The Farval Corp., Cleveland, O., has acquired the manufacturing and sales rights of the Farval centralized system of lubrication. This equipment was formerly manufactured by Lubrication Devices, Inc., Battle Creek, Mich. The officials of the company include Howard Dingle, president; W. W. Clark, vice-president; H. C. Robinson, treasurer; A. C. Blair, secretary. A. J. Jennings, formerly vice-president of Lubrication Devices, Inc., is general sales manager of the Farval Corp. The general sales and manufacturing facilities for the Farval lubrication system are now located at the Cleveland, Ohio, address. Distribution of Farval equipment for the central industrial section of the country is being handled by the Dingle-Clark Co., with offices in Cleveland, Cincinnati, Pittsburgh and Philadelphia. The Farval system provides the positive delivery of any type of lubricant to any number of bearings.

Wire Maker Moves Into New Chicago Warehouse

For years the American Steel & Wire Company, a subsidiary of the United States Steel Corp., has served the users of wire and wire products in the Chicago district from its local warehouse at 403 West Lake St. But, sooner or later, the old must give way to the more modern, even in warehousing and distributing. At its new Chicago warehouse, located at 2364 South Ashland Ave., which supplants the Lake St. location, the company will have the distinct advantage of a near south-side location.

Saving Through Safety

Eastern Cement Plants Join P. C. A. in . . . . Three Regional Meetings

THE cement industry as a whole may be suffering from the effects of depressed business conditions but there is no depression in safety interest within that industry. Following the impressive no-accident records made by a long list of plants last year, the Portland Cement Assn. is continuing its plan of holding regional meetings in various key cities of the country in order to keep the industry's safety spirit at high pitch. Three meetings were held during April—at Washington, D. C., Albany, N. Y., and Pittsburgh, Pa.

The gathering at the nation's capital took place at the Hotel Raleigh on April 7, with cement mills in that area participating. These included the Lehigh Portland Cement Co. plants at Allentown, Pa., Fordwick, Va., and Union Bridge, Md.; Lone Star Cement Co., Virginia, Inc., at Norfolk, Va., and Washington, D. C.; Medusa Portland Cement Co. at York, Pa.; and the Martinsburg, W. Va., Hagerstown, Md., and Albany, N. Y., mills of the North American Cement Corp.

A. R. Couchman, safety director for the North American Cement Corp., Albany, N. Y., was general chairman at the morning session, while W. M. Powell, safety director, Medusa Portland Cement Co., Cleveland, O., presided at the afternoon session. "Eliminating the Minor Accidents" was the subject of a paper presented by Paul A. Leichel, assistant superintendent of the Hagerstown plant of the North American company, while Howard Gray, power foreman at the Lehigh's Union Bridge plant, read his suggested procedure for safety meetings. An enjoyable feature was the showing of motion picture films taken at last year's regional safety meetings and at a number of important safety-trophy dedications. These were shown and explained by Mr. Powell. A resolution was adopted, urging that Congress give careful thought to the proposed reduction in the appropriation for safety work of the U. S. Bureau of Mines during the next fiscal year.

Dwight Morgan, vice-president of the Lone Star Cement Co., Virginia, Inc., served as toastmaster at the dinner held in the evening. The speaker was the Hon. Wm. R. Coyle, Congressman from Pennsylvania.

There was a total registration of 72 delegates, representing 12 cement plants, at the Albany meeting which took place April 12. Supt. C. H. Sonntag, of the Thomaston, Me., plant of the Lawrence Portland Cement Co., presided. A brief review of safety work for 1931 was given by Stanley Owens, safety engineer of the Portland Cement Assn. Mr. Owens brought out the fact that there are only 41 cement plants which have not as yet won a trophy for operating an entire year without an accident. A number of plant representatives participated in round-table talks which were carried out under the heading

W. M. Powell.

J. B. Zook.

"Our Best Safety Idea for Last Year." G. A. Hummel (Lone Star) declared that better lighting was the watch-word at his plant. E. P. Werner (Pennsylvania-Dixie) reported that periodical examinations to check eyesight of workers had a lot to do with keeping down their accident rate, while Gerald Quirk (Canada) reported the elimination of all belt drives at his company's Hull plant as one of its important contributions toward accident prevention last year. John J. Porter, vice-president of the North American Cement Corp., acted as master of ceremonies at the annual dinner, where the excellence of the entertainment vied with the delectability of the dinner.

Delegates to the Albany meeting came from plants in that region operated by the Lone Star Cement Co., New York, North American Cement Corp., Pennsylvania-Dixie Cement Corp., Universal Atlas Cement Co., Canada Cement Co., Ltd., Glens Falls Portland Cement Co., and Lawrence Portland Cement Co.

In the point of attendance the Pittsburgh meeting, held April 15, was the outstanding gathering of the month, a total attendance of 121 having been recorded. The Green Bag Cement Co. of Pennsylvania brought the largest delegation, 39 workers being registered, while the Universal Atlas and West Penn companies were close seconds, having 29 and 24 delegates, respectively.

R. L. Slocum (Universal Atlas) and L. M. McDonald (Canada) divided the responsibilities as chairmen of the meeting.

At luncheon the safety propagandists were honored by the presence of L. H. Burnett, vice-president, Carnegie Steel Co., who made an interesting talk on a topic of the day. The principal address on the day's program, was "Eye Injuries and Eye Protection" presented by J. B. Zook, chief engineer of the Great Lakes company at Buffalo.

How Safety Police Assist Our Plant in . . . . . Preventing Accidents

By LEROY BERGFELD
Marquette Cement Mfg. Co.

ON Nov. 24, 1931, the writer had the great pleasure of being present at the presentation of the Explosives Engineers Award, given through the National Crushed Stone Assn., to the quarry employees of the Cape Girardeau plant of the Marquette Cement Mfg. Co. This trophy is given each year to the quarry operating the greatest number of man-hours without a lost-time accident. This being the occasion of the third consecutive year that we had won the trophy, the award was made our permanent property.

This unparalleled record in accident prevention was so extraordinary that I could not be content until I had analyzed our safety movement to determine just what outstanding feature I could credit for our phenomenal success, and in the hope that it could be passed on to some infant safety organization struggling with the difficulties and disappointments that usually accompany the first few years in this great work, that their burden might be lightened and success crown their efforts just a little sooner.

While we possess several outstanding attributes that could possibly be classed as the most important features of our safety organization, I believe our safety police and safety court are really the forces that are responsible for our success in accident prevention. We do not claim originality in the police and court methods; however, our methods of application of safety principles through this channel have never been duplicated, as far as we know. We do know that several companies have adopted our system, with some modifi-

cations, of course, and without exception their results have been unquestionably successful.

Our records show that our first attention to a police and court system came from a chance remark at the 1927 meeting of the National Safety Congress held in Chicago and attended by the general mill foreman, the safety engineer, and the quarry superintendent. Upon their return they gave a report of this meeting to the men and, speaking of their experiences at the safety congress, mention of a "kangaroo court" was made. This caused some inquiry as to the functions of a court in accident-prevention work. The result of this discussion was the nucleus of our present safety police and safety court.

Our first attempt to use this system was somewhat crude but effective. We had a police chief for the mill and one for the quarry; the quarry superintendent was the judge for cases arising under his jurisdiction; the plant superintendent acted in like manner. In both cases the safety engineer acted as the prosecuting attorney. At this time the judge was the final authority on all cases coming into his court. We felt that this feature was not the correct method with which justice should be administered, and that other improvements in our safety court could be made. And, accordingly, in 1928 the system was modified to one court for both mill and quarry, the plant superintendent presiding as the permanent judge. The safety engineer continued as prosecuting attorney, the safety committee acting as the jury for all cases. At this time the chief appointed the different police.

The chiefs of the safety police are elected by the popular vote of all workmen, much enthusiasm and interest being aroused through this method of selection. Our elections correspond much to the regular election of civil officers in the county and state. As usual among an organization of our size, several factions exist. A favorite in each faction would be posted as a candidate for election as chief of the safety police, and a primary election held using printed ballots. Previous to the final elimination voting, and subsequent to the primary election, we usually call a mass meeting of all employees and allow the candidates to take the "stump" for a few minutes in their own behalf. Generally we have three men receiving the greatest number of votes in the primary go on the ticket for the general election, so that about 10 min. is allowed for each candidate to make his talk. However, sometimes they plead so eloquently and take their position so seriously that 10 min. each is not sufficient. So far we have not placed a definite limit on campaign speeches as we think much benefit is derived from this feature.

After the polls are closed the ballots remain in the ballotbox until the next regular safety meeting, when the votes are counted by the safety committee. To prevent errors all ballots are double-checked and, to make sure the votes are legal, each voter must place his clock number on the ballot. The ballotbox remains locked from the day of the election until the actual count is made.

During the period in which the ballotbox has been used we have had only one occasion for dissatisfaction, when for some reason the men decided to vote several ballots instead of just the lawful amount, and it was necessary to hold another election. This, however, reflected a friendly attitude as very much fun was had and quite a bit of talk resulted from the stuffed ballotbox. So, the cost of the second election was absorbed through the additional safety discussion over the ballotbox incident.

In 1931 the chief of safety police was relieved of the responsibility of appointing the various police officers, and the entire safety committee, excepting the judge and the safety engineer, were sworn in as regular officers during their term as committee-men, which is three months.

The safety committee, or safety police, is appointed by the various foremen and numbers about 27 men. Assuming that our organization numbers about 350, and that the period of service is three months, we have one complete service cycle taking in every man in the organization once in 40 mo. This gives each man who has been in our employ four years or more, 7½ per cent. of his time on active police duty.

The mill and quarry chiefs each serve 6 mo. and are awarded a prize for their service. This reward is a trip to some of the conventions, or a one week's vacation with pay, and serves as a very powerful incentive to keep the chief on the job. The chief is equipped with a regulation cap, star, and the usual club. It is his duty to keep his subordinates in line, make the arrests, secure the necessary witnesses, make a general inspection tour at regular intervals, etc. All committee-men are equipped with the regulation star to denote their authority as safety police. They have the authority to make an arrest at any time without consulting the chief. However, it has been the practice to discuss the matter with the chief before the arrest is made. We do not care to make arrests that are not justified, or where the violation is such that a word of warning will serve our purpose better.

Probably the greatest indirect values of the police system are the election and the campaign speeches, and of no less value is the grand rally that takes place after the votes are counted. This feature generally occurs on some near-by creek bank, where the winning candidate expresses his appreciation for the honor thus conferred upon him by giving a party to which all employees are invited to participate.

Generally the feast is prepared by someone of our organization who excells in the culinary arts, preparation beginning about noon and serving starting immediately after the working hours. During the summer months these out-door gatherings are of inestimable value, and usually the feast continues until the wee small hours of the morning. The latter part of the evening is given over to speeches, refreshments 'n' everything. It is the rule that all those who attend shall make a few remarks concerning the subject of safety. Coöperation in this respect is easily obtained. Difficulties are sometimes encountered in attempting to limit the time used and the number of speeches to be delivered at one time. However, the spirit of utter democracy which reigns at these meetings, and continues to some extent afterwards, is the essence of the safety organization; and is indirectly responsible for the wonderful coöperation and interest shown in the movement. It is again reflected in the attitude of the men towards the safety court, especially in accepting and working out the penalties imposed for infraction of the safety laws and for participation in unsafe practices.

The safety court consists of the judge (the plant superintendent), the safety engineer, who acts as prosecuting attorney, and the jury composed of the regular safety committee-men, or the police force, and averages about 25 present at each meeting, each department being represented.

Court procedure is based on legal court action, complaint against the offender being made to the police, or the chief, who then locates witnesses and collects evidence. If sufficient of each are found and if, in his estimation, the violation is of such importance that court action is necessary, the warrant is issued, and the arrest is made. The date is set for the trial and witnesses are subpœnaed. Two witnesses are required for each arrest. The defendant has the privilege of defending himself or asking the court to provide this defense. After all evidence is collected the defendant is conducted from the court room and the cases turned over to the jury. A vote is taken and the results noted. The defendant is then returned to the court room and advised of the decision of the jury. The judge reserves the right to take a case from the jury at any time where the violation is of such magnitude that the case can not be handled properly through the regular functions of the safety court.

Once each year a meeting is called for the purpose of drafting a new safety program. The program committee is composed of the plant superintendent, the safety engineer, two foremen and two workmen. The old

program is reviewed, suggestions are made, and a regular round-table discussion is held. Previous to this time suggestion boxes are placed at the mill and quarry time-clocks, and all employees are invited to offer suggestions for the new program. After the new program is drawn up, approved and adopted, it becomes the law around which the safety police and court revolve for the year.

The court is part of the regular safety meeting, and is held each Wednesday morning from 9 until 10 o'clock, except that one meeting each month is composed of the foremen only.

An average of 75 cases is prosecuted within the year, about 50 convictions being secured. This brings at least one hazard each week before the committee for discussion.

The court discourages any intention of the defendant to plead guilty. Should this be allowed all the essence of the arrest would be lost. We think the discussion that results from the arrest, brings out the points of most interest and value, whether or not a conviction is obtained, the fine, or penalty, attached being merely evidence of guilt. These fines are drawn from a box by the defendant and handed to the judge who announces to the jury the penalty written on the card.

The fines or penalties vary, some merely requesting the victim to write another penalty to be placed in the box. Others, request a short talk at the next safety meeting, or that the offender discuss his offense before the court. All fines carry the added penalty of being photographed for the "rogues' gallery." One particular penalty is that the defendant wear a large sign pinned on his back stating that he has been careless.

All members of the organization are subject to the jurisdiction of the court. Quite frequently the judge, who is the plant superintendent, disqualifies himself and goes before the court, on trial for carelessness. So far he has been convicted almost every time, and has had his photograph placed in the "rogues' gallery" for each offense.

The "rogues' gallery" is comprised of the pictures of all men convicted for carelessness. Each picture carries the offender's name, the date of his conviction, his occupation and the charge, and is placed in the mill clock-room, where every one can see the visible results of the safety court. All offenders are required to wear black-and-white convicts caps while being photographed.

It is truly remarkable the spirit of harmony that exists throughout our entire court. During the period of its activities, there have been only a few cases of open hostility. We have not made use of the penalty for contempt of court, as perfection is not expected. We realize that a show of spirit is to be expected, and would much rather see the men stand firm on their rights, than meekly to accept, without offering defense, any action the court may care to take. However, the judge has threatened a few times to give the defendants double penalties for interrupting the court. I think the men really recognize the gravity of the situation, and lend every possible effort to make the police force and the safety court an efficient unit of the organization. Ordinarily, deportment in the court room is much the same as we would expect to find in the regular courts of the state. Court procedure functions smoothly and efficiently. There are very few interruptions or unnecessary noises or disturbances of any nature.

While I have dwelt at considerable length on the action of the court, I really think that court is responsible for our successful application of accident-prevention principles; and much of the success is due directly to the tact with which our safety engineer manages the court. It is no easy affair to direct the safety of 350 workmen for several years and still retain control over the situation, hold the coöperation and good-will of the personnel, and keep up the interest in the movement. Surely it requires a keen understanding of human nature, a tireless student of mass reäction, one who unflinchingly and unafraid performs his every duty, no matter how difficult the task, or how small the reward.

SALES AGREEMENT AND CONTRACT

THE CRUSHED STONE CO.
herein called SELLER, sells and agrees to furnish and

herein called PURCHASER, purchases and agrees to receive and pay for in the quantity and on the terms and conditions hereinafter expressed.

PROJECT:

SIZES	QUANTITY	PRICE	F.O.B.	DELIVERY

FREIGHT RATE:

Delivered prices are quoted only for the convenience of the PURCHASER. PURCHASER is liable for any increase in freight rate or tax thereon and shall benefit by any reduction.

TERMS OF PAYMENT:

If at any time the financial responsibility of PURCHASER becomes impaired or unsatisfactory to SELLER, SELLER reserves the right to exact payments in advance or satisfactory security or guarantee that invoices will be paid promptly when due. If PURCHASER fails to comply with terms of payment or with any other provisions of this agreement, SELLER reserves the right to cancel the unfilled portion of this contract, PURCHASER remaining liable for all unpaid material furnished and for all damages incident to PURCHASER'S default.

TIME OF DELIVERY: Material to be furnished during the period beginning and ending 193 Shipments to be made at the rate of approximately tons per day but not to exceed tons per day. PURCHASER shall give SELLER shipping instructions a reasonable time before shipments are to be made or modified. SELLER shall not be responsible for delays caused by strikes, accidents, car shortage or other contingencies not under SELLER'S control, nor for any delays in transportation. If PURCHASER fails to order all the material to be shipped within the time provided then SELLER reserves the right to extend the time of delivery but shall not be obliged, except at SELLER'S option to furnish any part of said material after 193

SPECIFICATIONS:

CLAIMS: SELLER'S responsibility for lading of cars ceases with proper delivery to the carrier. Railroad weights and rules are to govern all railroad shipments. Standard scale weights are to govern all other deliveries. The SELLER will not honor claims for material for failure to comply with the standard of quality nor allow credit for rejection of material unless notified by telegraph immediately after rejection and before unloading, all such claims being subject to inspection of material in car by an authorized representative of the SELLER.

ASSIGNMENT: PURCHASER shall have no right to assign this contract without written consent of the SELLER. The material covered by it is sold to the PURCHASER upon the representation that it is purchased for use in the construction of work in connection with project above referred to. Use of material covered by this contract in any work other than indicated herein or the disposition of it for any other purpose shall give SELLER the option to terminate this contract and such termination shall not prejudice any claims of SELLER for the value of material furnished or for damages.

Executed this day of 193

THE CRUSHED STONE CO.

By..... Dist. Sales Manager

By..... Title

Standard form of sales agreement and contract as used by crushed-stone producers in New York and Pennsylvania.

TZ REDUCTION CRUSHER

With Patented Bell Head and Concaves

Greater Output . . . . . Minimum of Waste Fines
Least Cost per Ton . . . . . Maintenance Negligible

A Skeptical User Says

"«««When you presented this type of crusher to me for consideration, I was skeptical as to its performance«««Upon your assurance«««we placed the order with you and I am glad to state that it is one of the finest installations we have ever made.«««Its performance has been a decided revelation to other operators.«««"

It's EZ with the TZ

In connection with certain types of non-choking crushers, we call the attention of the public to our patent 1,837,102 issued December 15, 1931, relating to crushers of this type. We intend to enforce our rights under said patent against all manufacturers and users of stone crushers containing the features covered by said patent and to prosecute all infringers of said patent.

Traylor Engineering & Manufacturing Co.

ALLENTOWN, PENNSYLVANIA

NEW YORK 2513 Empire State Bldg. | CHICAGO 2131 One LaSalle St. Bldg. | LOS ANGELES 908 Chester Williams Bldg.
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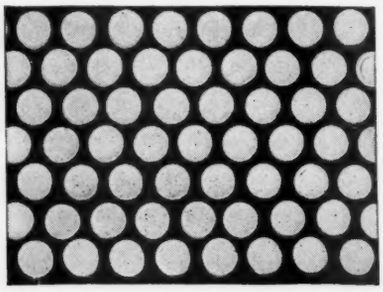
TIMMINS, ONTARIO, CANADA, Moore Block
Export Department, 104 Pearl St., New York City—Cable Address: "Forsaltra"

MORROW SCREEN PLATES

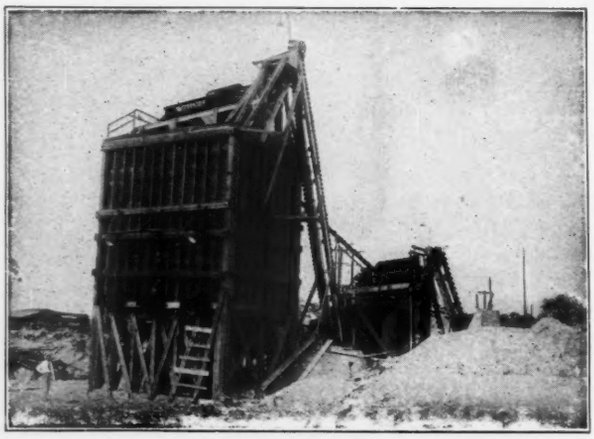


MORROW PERFORATED METAL SCREEN PLATES for sizing and preparing coal, sand, gravel, stone and other bulk materials are made by a Company specializing in screening machinery.

A complete set of punches and dies covering a wide range of sizes, in round, square, oval and diagonal slots are ready for the press, insuring prompt delivery of orders.

Prices are right.
Send for Bulletin 57.

The Morrow Manufacturing Co.
Wellston, Ohio



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BUILT FOR LONG, HARD SERVICE WITH LOW MAINTENANCE COST

We offer RELIANCE Crushing, Screening and Washing equipment in capacities from 50 to 1500 tons per day. Simplicity of design with low operating cost and clean separation.

CATALOGUE AND FULL INFORMATION ON REQUEST

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KINGSTON, N. Y.

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LEADERS SINCE 1835

CRUSHERS—Double roll and Sledge Wedge Crushers, for practically any product. Capacities to 1000 tons an hour.

SUPER DRY PANS—For especially large tonnages.

WASHERS AND SCRUBBERS—Steel log Washers; scrubbers, cylinder washers, sand drags and washing screens.

DRYERS—Revolving cylindrical, of various sizes.

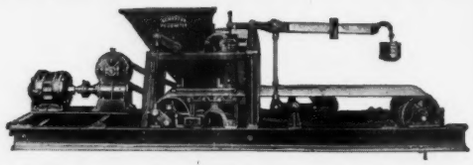
JIGS—For concentrating and beneficiating hematite and manganese ores.

SCREENS—Cylindrical and conical screens of any size and capacity.

HOISTS, ELEVATORS AND CONVEYORS—Electric, friction and gravity hoists, steel conveyors of different sizes and capacities.

McLanahan & Stone Corp.
Hollidaysburg, Pa.

PROPORTION BY WEIGHT



SCHAFFER POIDOMETERS will proportion your stone and clay or gypsum and clinker by weight with an accuracy of 99%.

If you have a mixing problem you would like to handle automatically and accurately it will pay you to investigate SCHAFFER POIDOMETERS.

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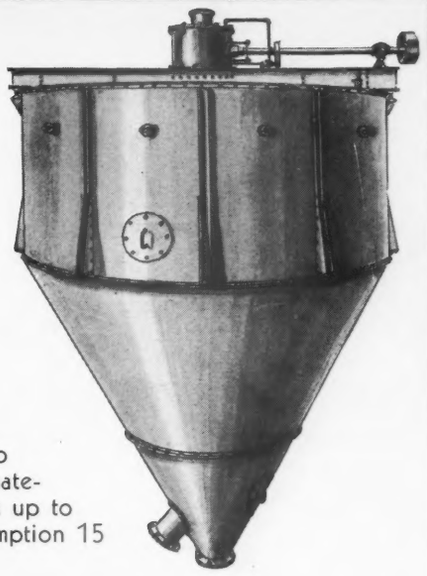
for the production of

CEMENT, LIMESTONE, GYPSUM, COAL, etc.

The BRADLEY LINE offers the producer an installation for practically every pulverizing problem, assuring the ultimate in capacities and finenesses.

The distinguishing features of BRADLEY MILLS are **low maintenance costs** and **low power consumption.**



SAVE!

The addition of an Air Classifier to any pulverizing system will show material savings, increasing capacities up to 70%, reducing power consumption 15 to 20%.

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CAPACITIES: 1 to 60 TONS PER HOUR

FINENESSES: 20 to 350 MESH

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☐Belt dressing
☐Belt fasteners
☐Belting, conveyor and elevator
☐Belting, transmission
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☐Bin gates
☐Bins, concrete
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☐Blasting supplies
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☐Boats, self-unloading
☐Bodies, Motor Trucks
☐Brake Linings
☐Buckets, Clamshell
☐Buckets, Conveyor and Elevator
☐Buckets, Dragline
☐Buckets, Orange Peel
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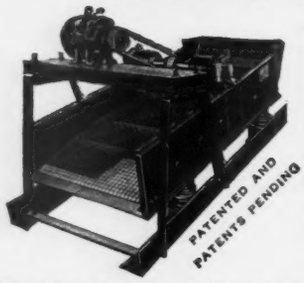

Produces with high efficiency and accuracy larger tonnages per square foot of effective screening area than any other machine of its kind. Differential conveying action of Plat-O Screen permits operation at very flat angle. Controlled action of screen cloth greatly increases capacity output.

All popular sizes, single, double, and triple deck. Send for our New Bulletin.

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1933 EAST WAYNE STREET FT. WAYNE, IND.

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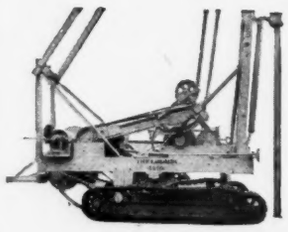

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Size 44 "Clipper" comes equipped with steel frame, wooden or steel mast, wire or manila line.

Write for full information.

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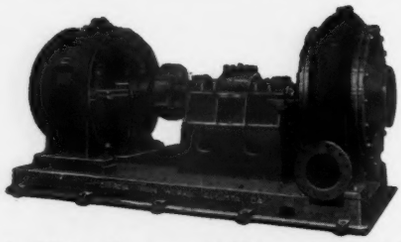
SAND AND DREDGING PUMPS



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For fine grinding, air separating and air drying all kinds of rock products and many other materials.

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SIMPLICITY DEPENDABLE
THE SIMPLICITY SYSTEM COMPANY
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Lewistown Foundry Products
ARE
Performance-Tested

BUCKET ELEVATORS
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Perforated Metals—Screens of All Kinds—For Sand, Gravel, Stone, Etc.

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Steel, Stainless Irons, Copper, Bronze, Monel, Zinc, and Aluminum or any other metals, in a great variety of designs—round, square, slots and fancy perforations.

Other items in our line are:

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Prompt service, Expert workmanship

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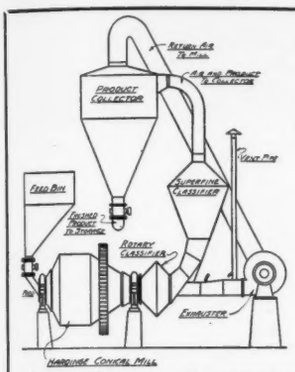

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A Hardinge Conical Mill, equipped with the Hardinge Air Classifier, replaced an old mill of another type last year to grind Limestone. The Hardinge Mill has paid for itself already, and is now saving 35% on the old grinding costs.

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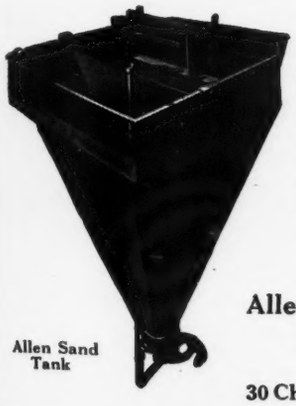

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ACCURATE and AUTOMATIC in the economical classification of sand. For years, the choice of the most experienced operators.

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SEE for yourself just why this unusual belting material is especially adapted for dirty, gritty, strenuous duty in quarries.

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Get your sample and note the tough surface,—the strong, uniform texture which makes it different from every other belting material. Test it for water-proofness and steam-proofness.

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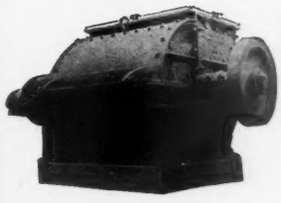

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Overhauled in our own shops and guaranteed subject to thorough trial in service.

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1—Morris Heavy Duty Sand and Gravel Dredge Pump, direct connected to 125 H.P. G.E. 3P, 60 cy. 220-440 V. slip ring motor with coupling and one piece cast iron base. Continuous varying speed resistor and drum controller included.

1—Sauerman Slackline Cableway—1½ yd. 700' span complete with bucket and carrier, tension and guide blocks, operating cables, guy cables, shifting device, steel mast and electric hoist—3P 60-220-440 V. electrical equipment.

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NEW 84"x60" Jaw Crusher

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Screens—5 to 300HP—60 Cy. 3 Ph. Motors (New) etc.
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3 PHASE, 60 CYCLE

HP	Make	Volts	Type	Speed
1-800	G. E.	2300	Slip Ring	720
1-600	G. E.	440	Synch.	360
1-300	Al. Ch.	2200	Slip Ring	585
1-275	G. E.	550	Synch.	900
2-200	G. E.	2200/440	Synch.	514
1-200	Wsthse.	440	Slip Ring	500
1-200	F. M.	440	Slip Ring	600
1-200	Wsthse.	220/440	Sq. Cage	585
1-150	G. E.	550	Synch.	720
1-104	G. E.	220/440	Slip Ring	870
1-100	Wsthse.	220/440	Slip Ring	575

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HAVE A LARGE ASSORTMENT OF MODERN LOCOMOTIVES, 5 to 100 TONS, ALL TYPES, REBUILT AND READY, STEAM AND GAS SHOVELS, ETC.

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